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# Olivocerebellar circuit. Structure and functions

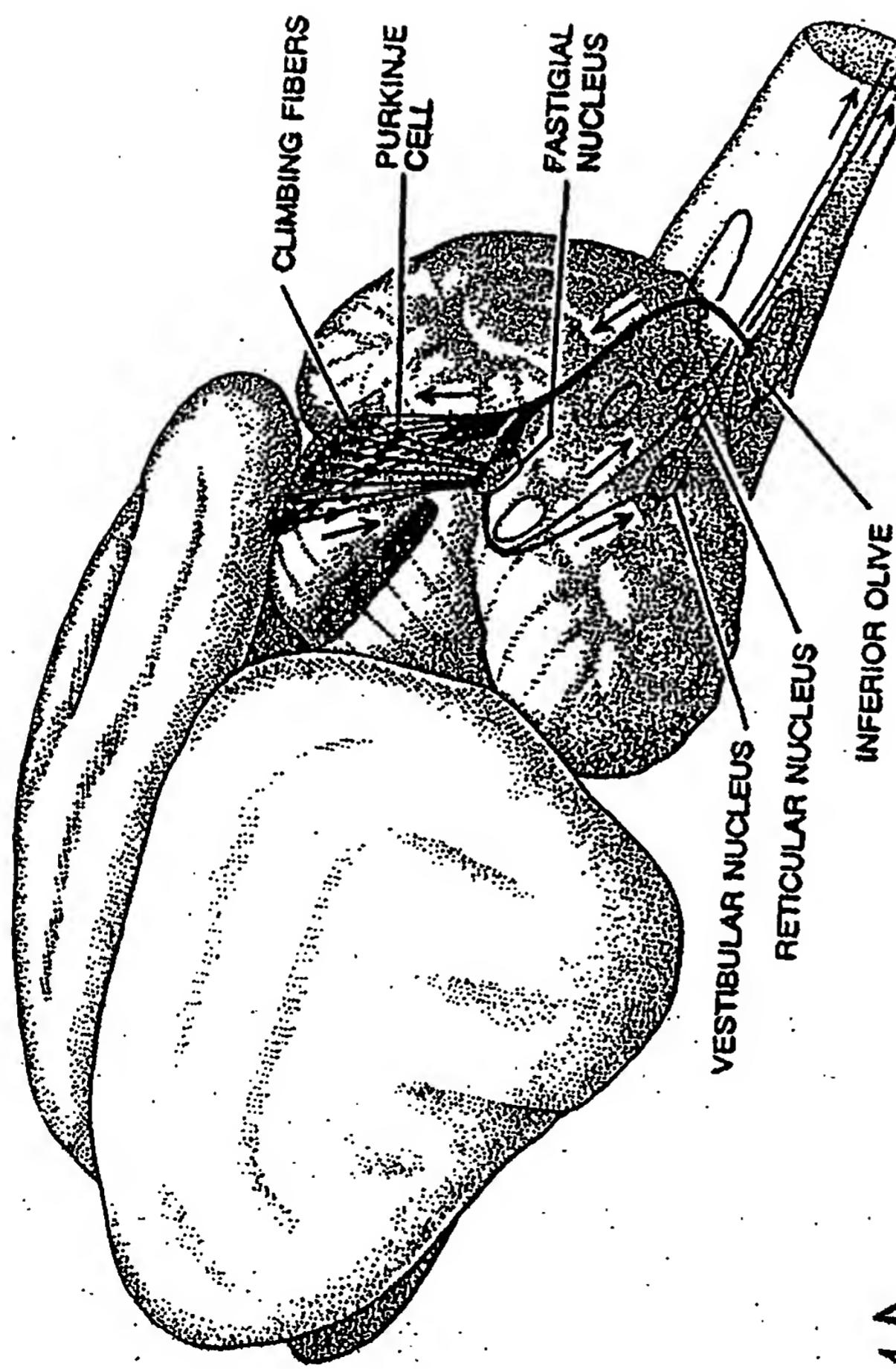


FIG. 1A

Olivocerebellar feedback loop.

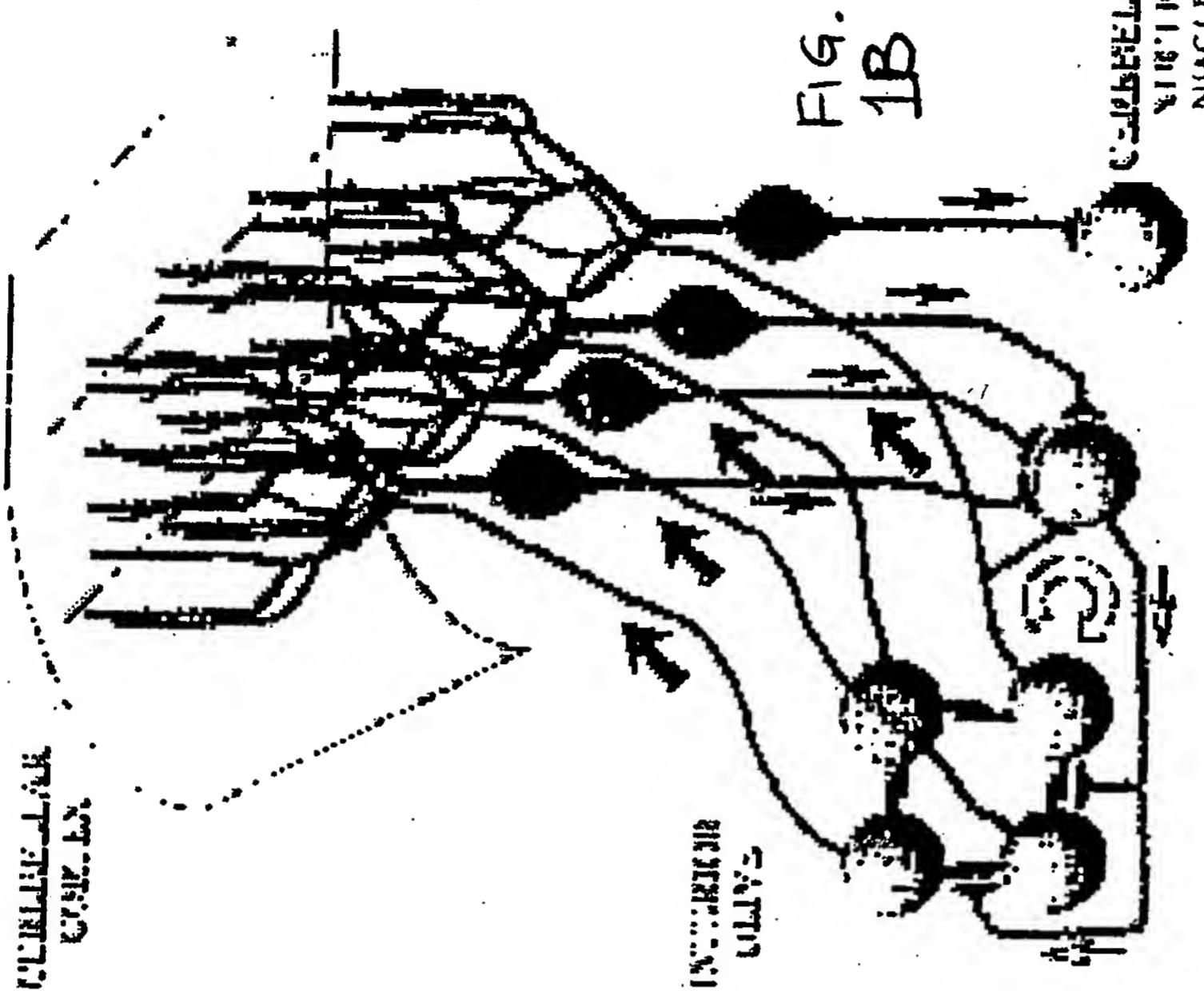
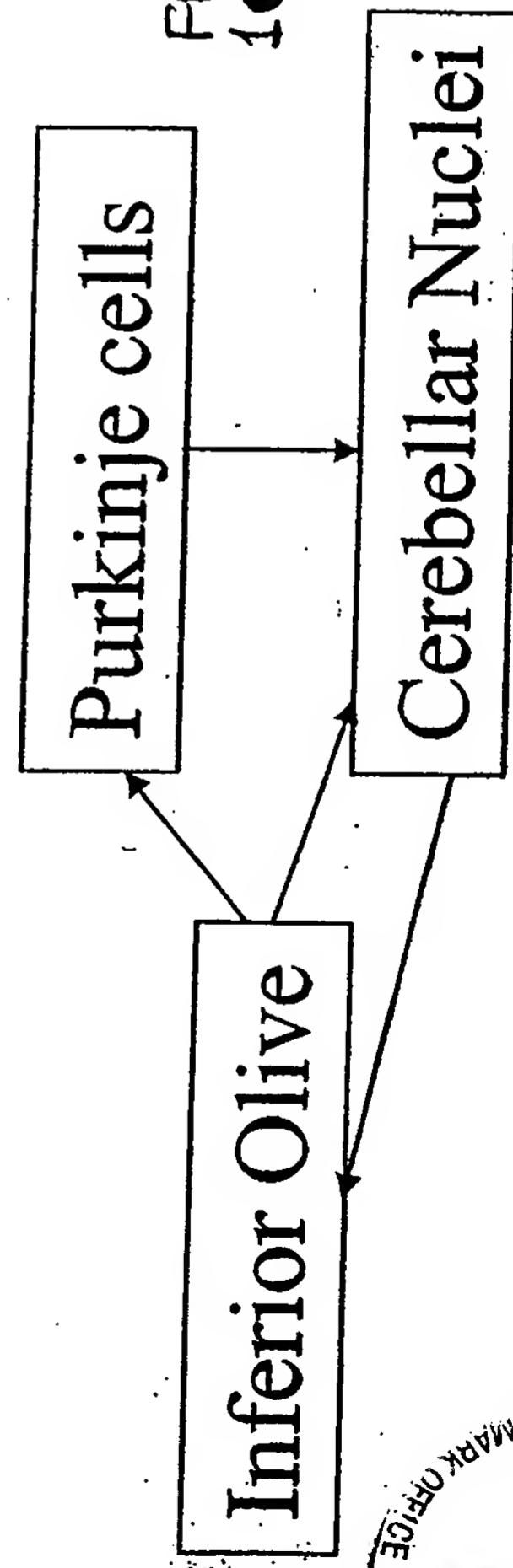


FIG. 1B

Functional circuit.

FIG. 1C



ELECTROPHYSIOLOGY OF NEURONES IN OSCILLATION AND RESONANCE 9

FIG. 2A

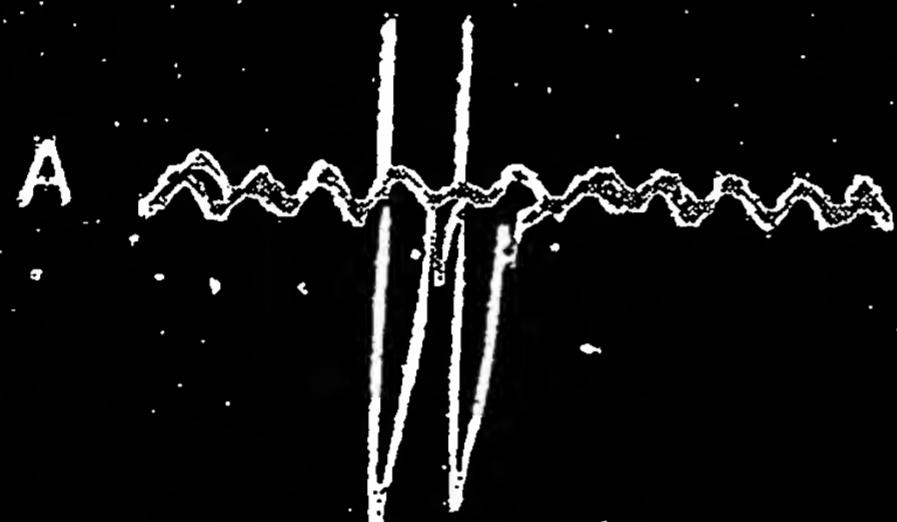


FIG. 2B



FIG. 2C



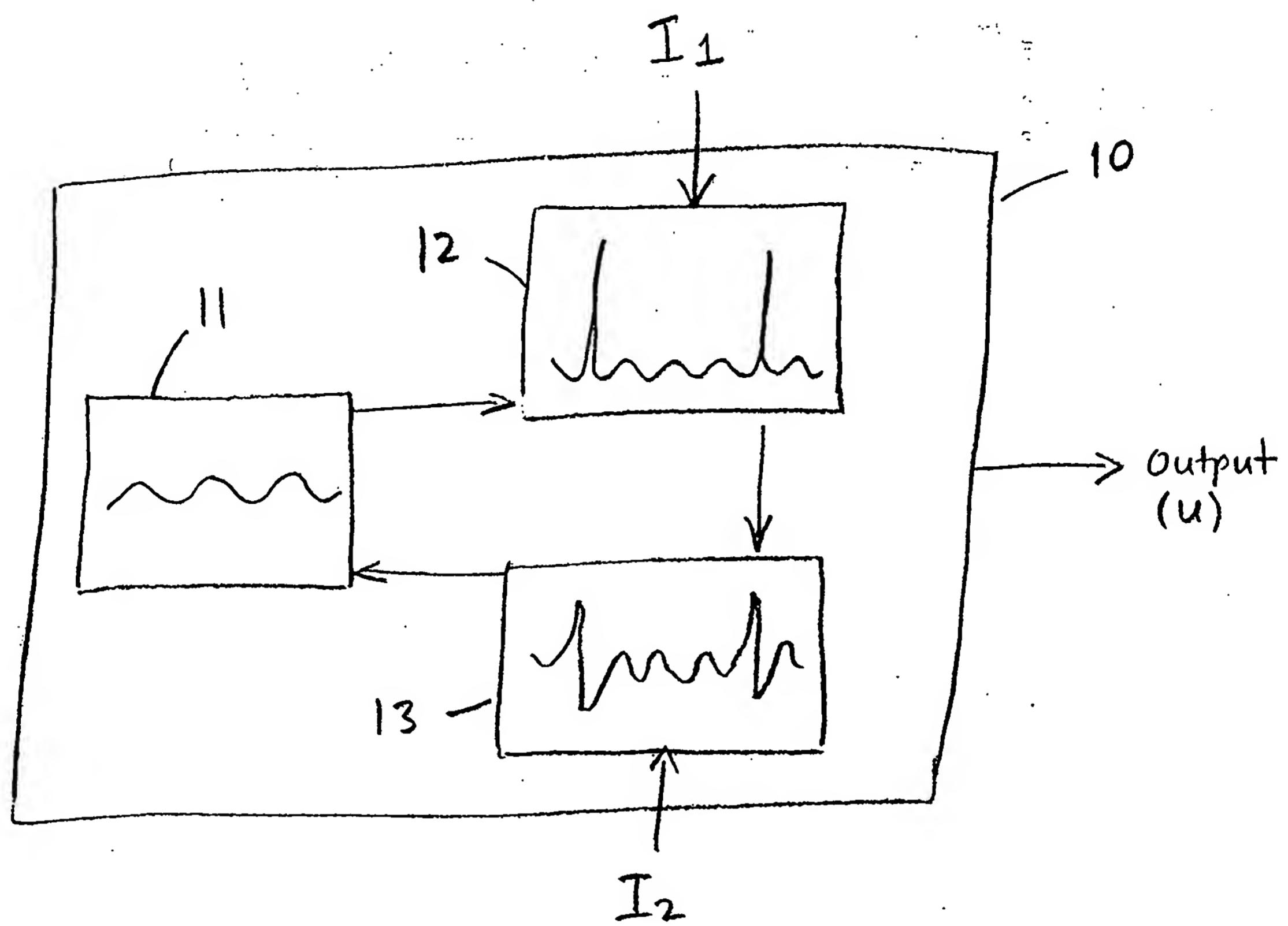


FIG. 3

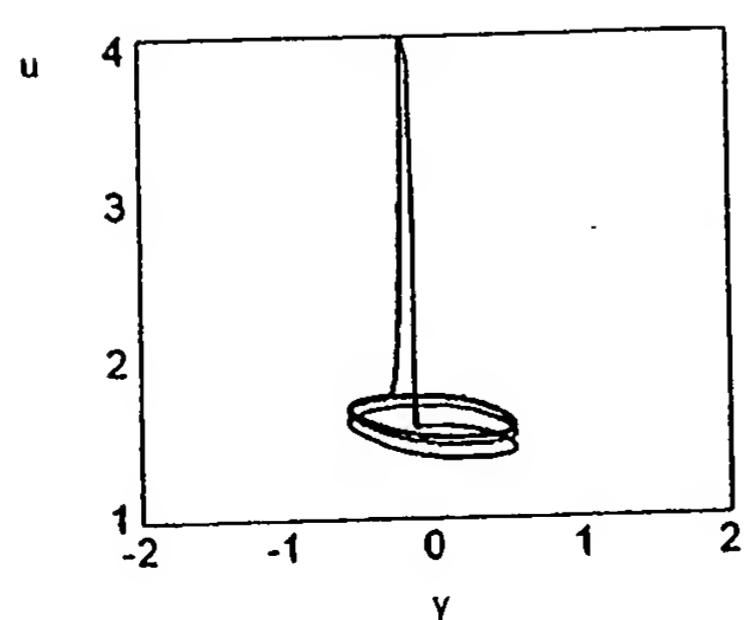
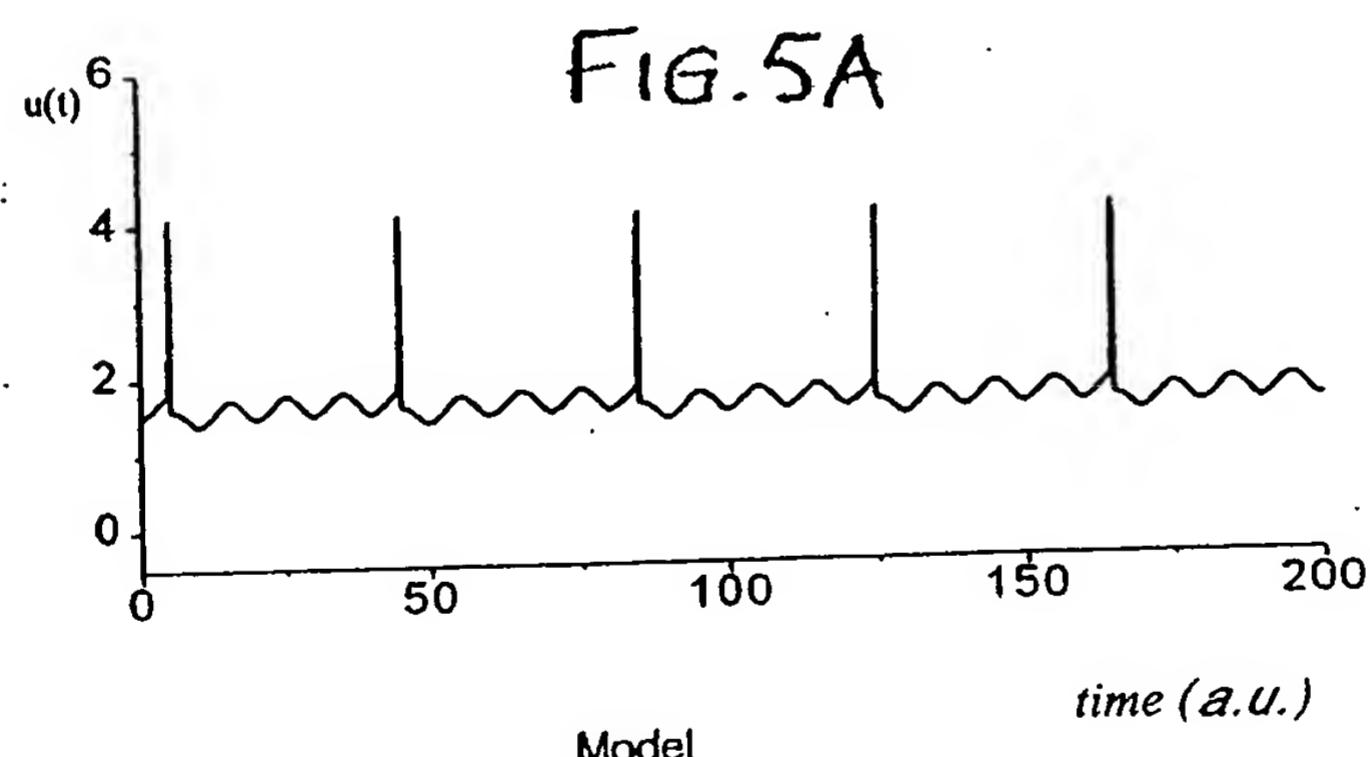
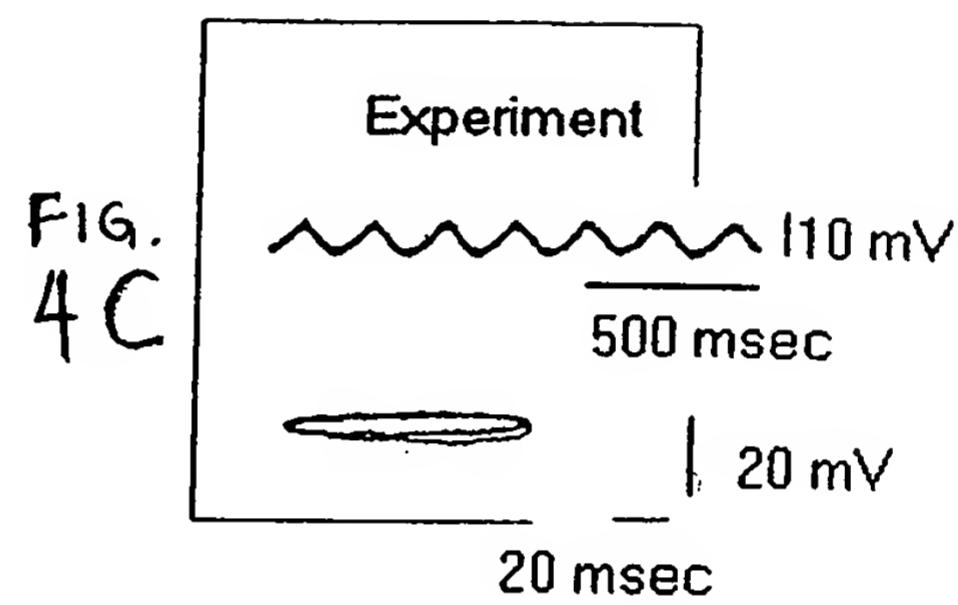
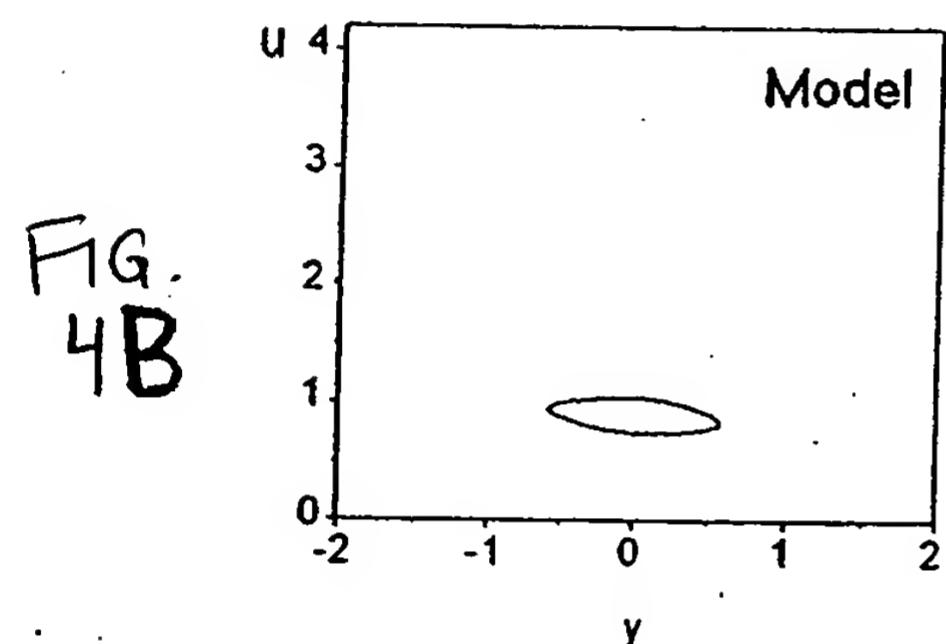
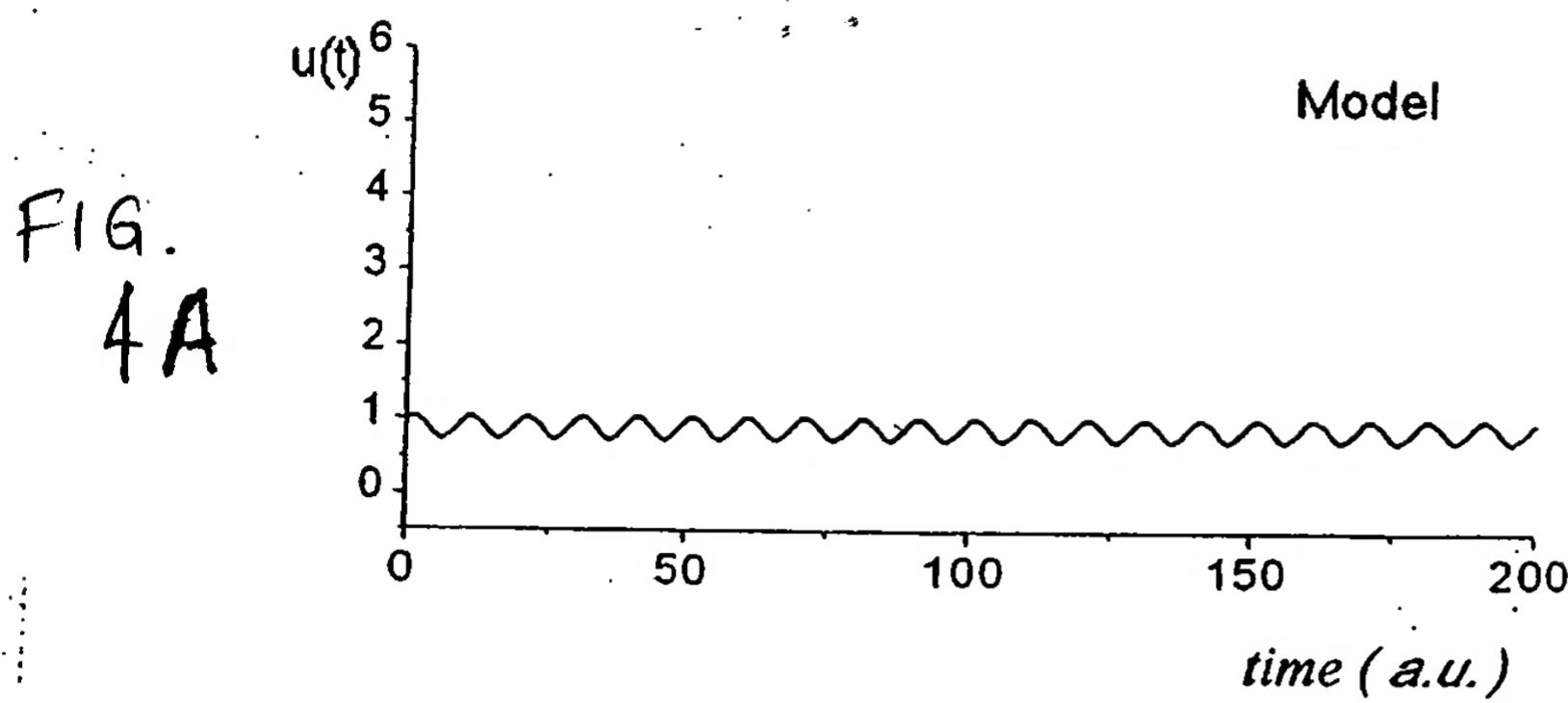
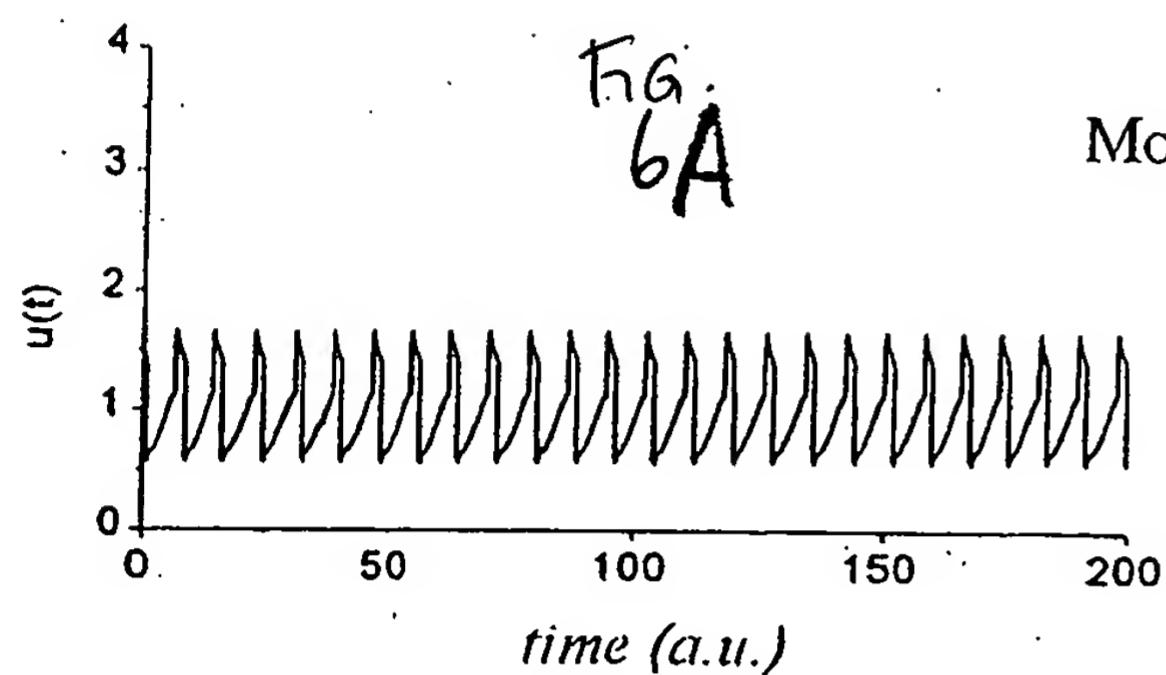
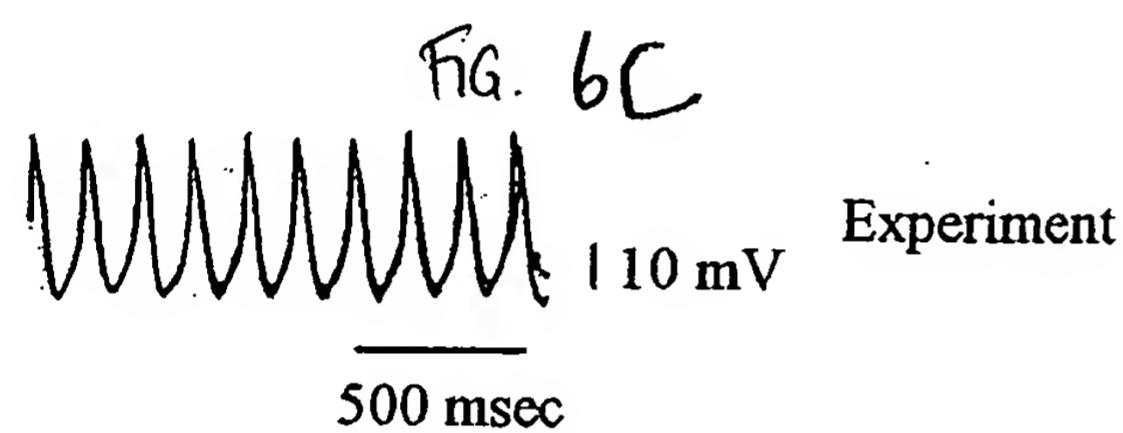
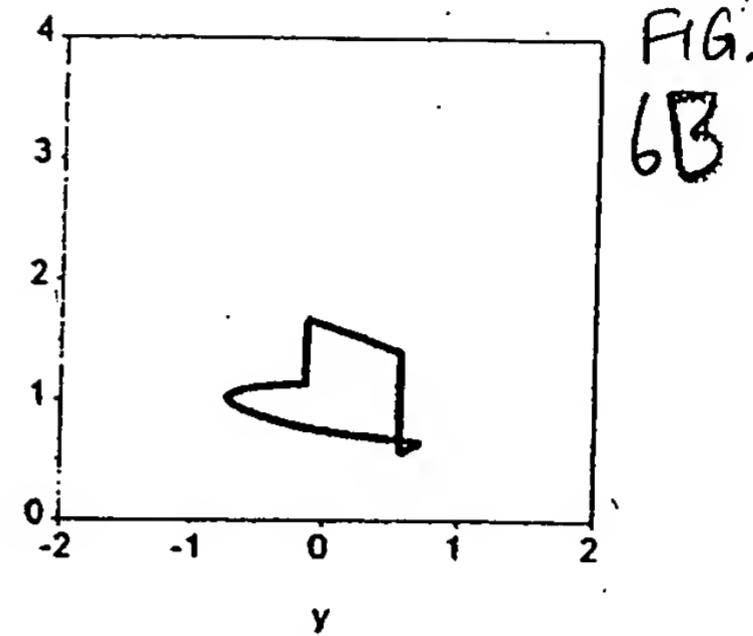


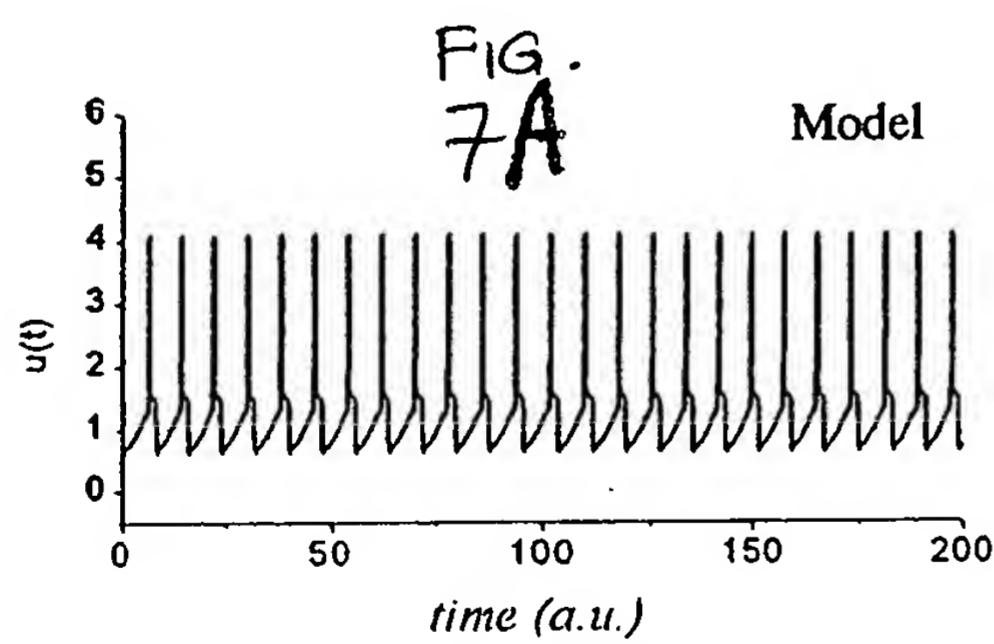
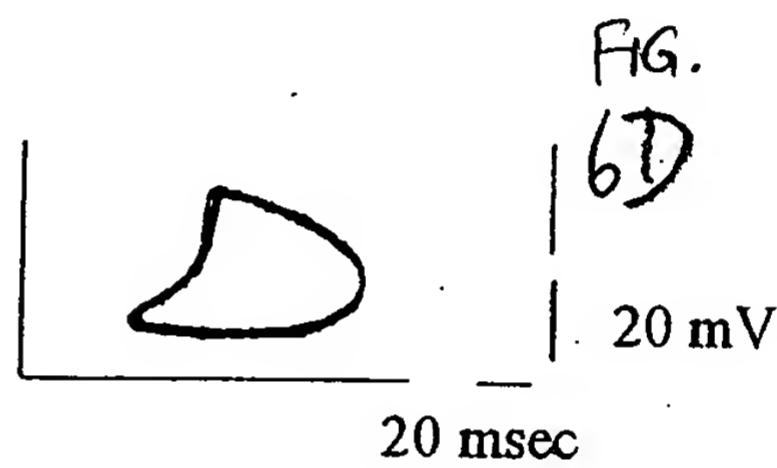
FIG. 5B



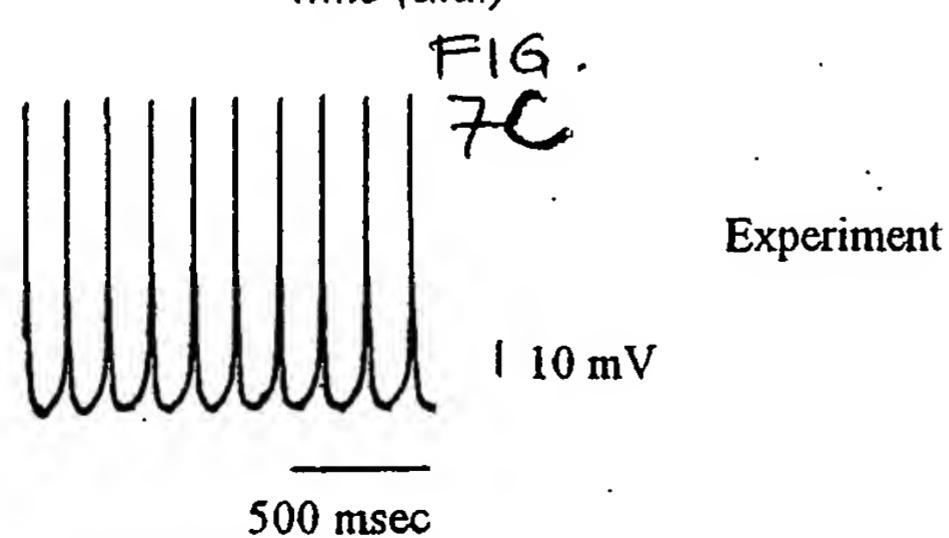
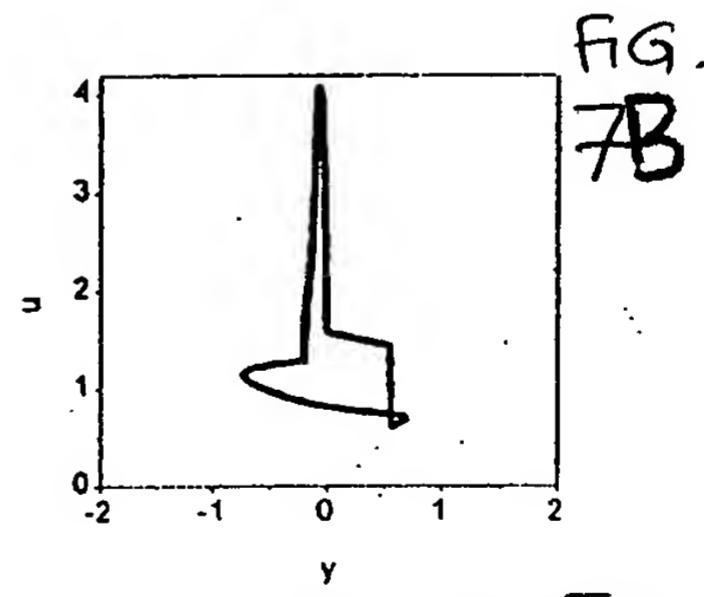
Model



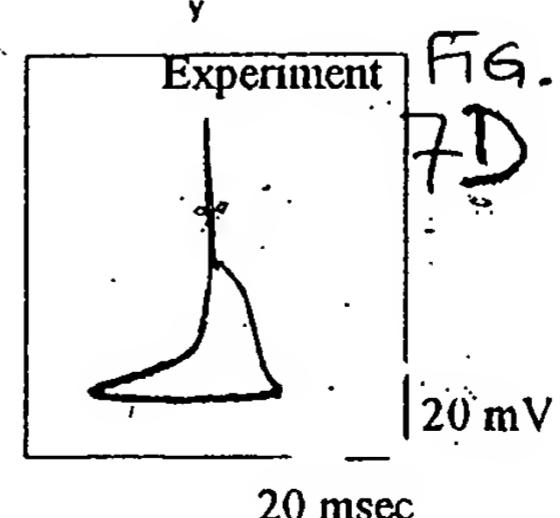
Experiment



Model



Experiment



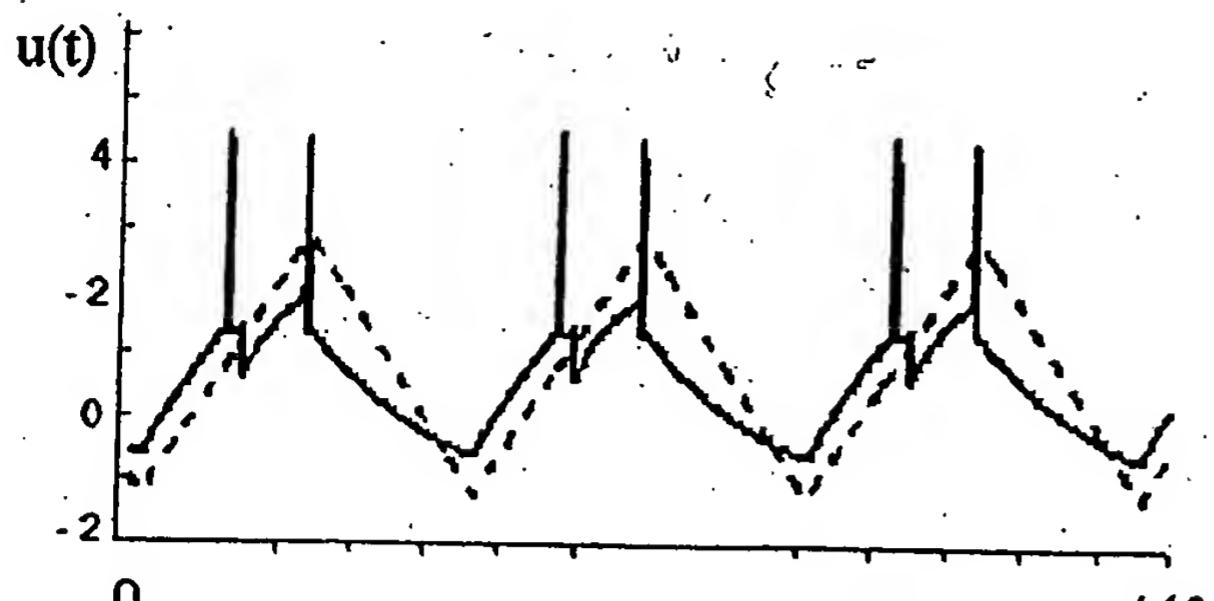


FIG. 8A  
time (a.u.)

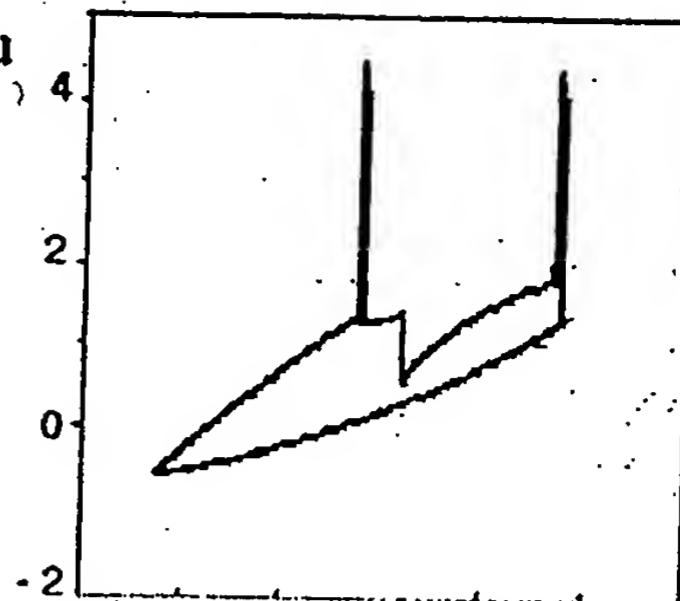


FIG. 8B  
I(t) stimulus

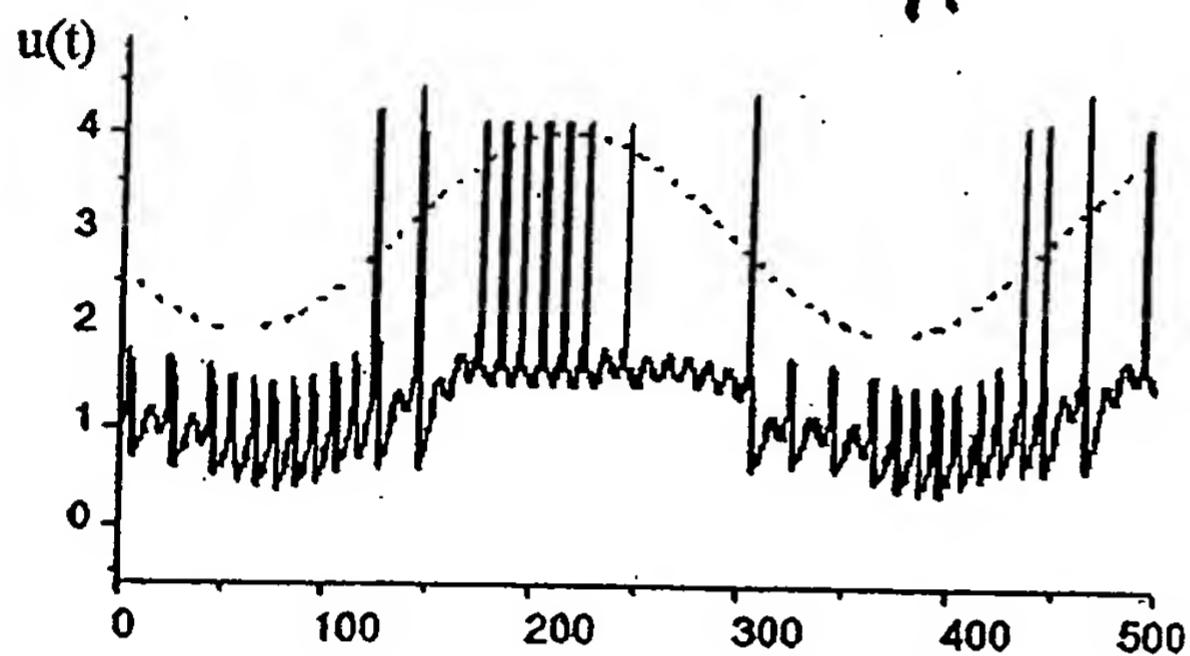


FIG. 8D  
time (msec)

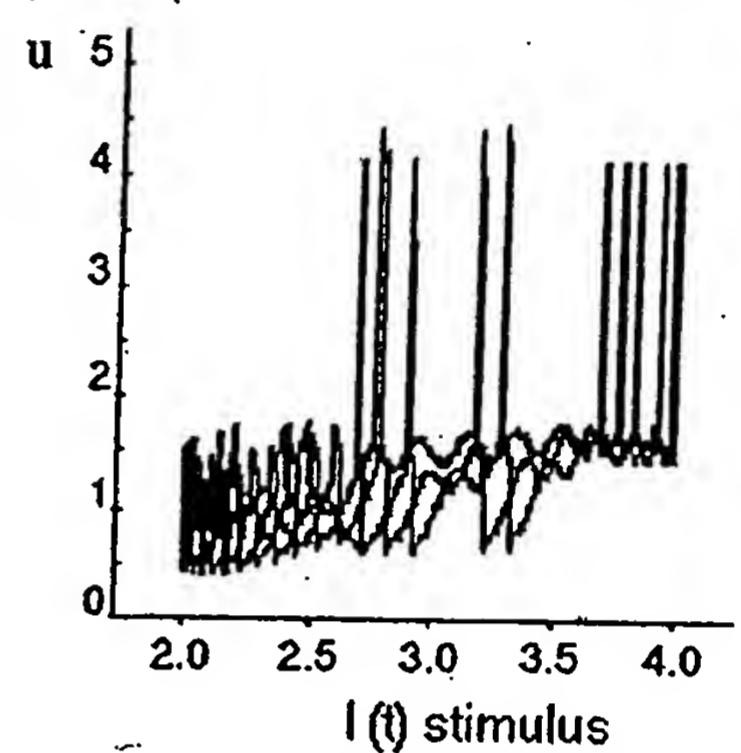


FIG. 8E  
I(t) stimulus

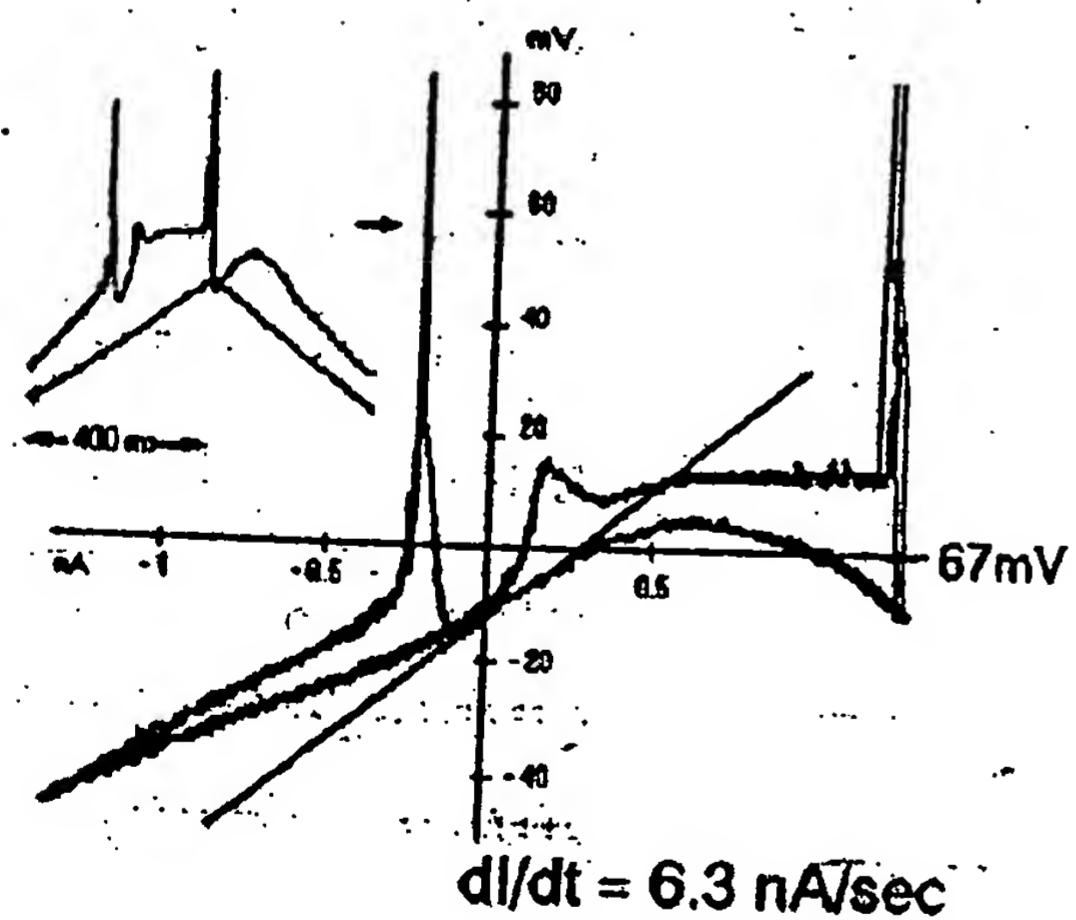
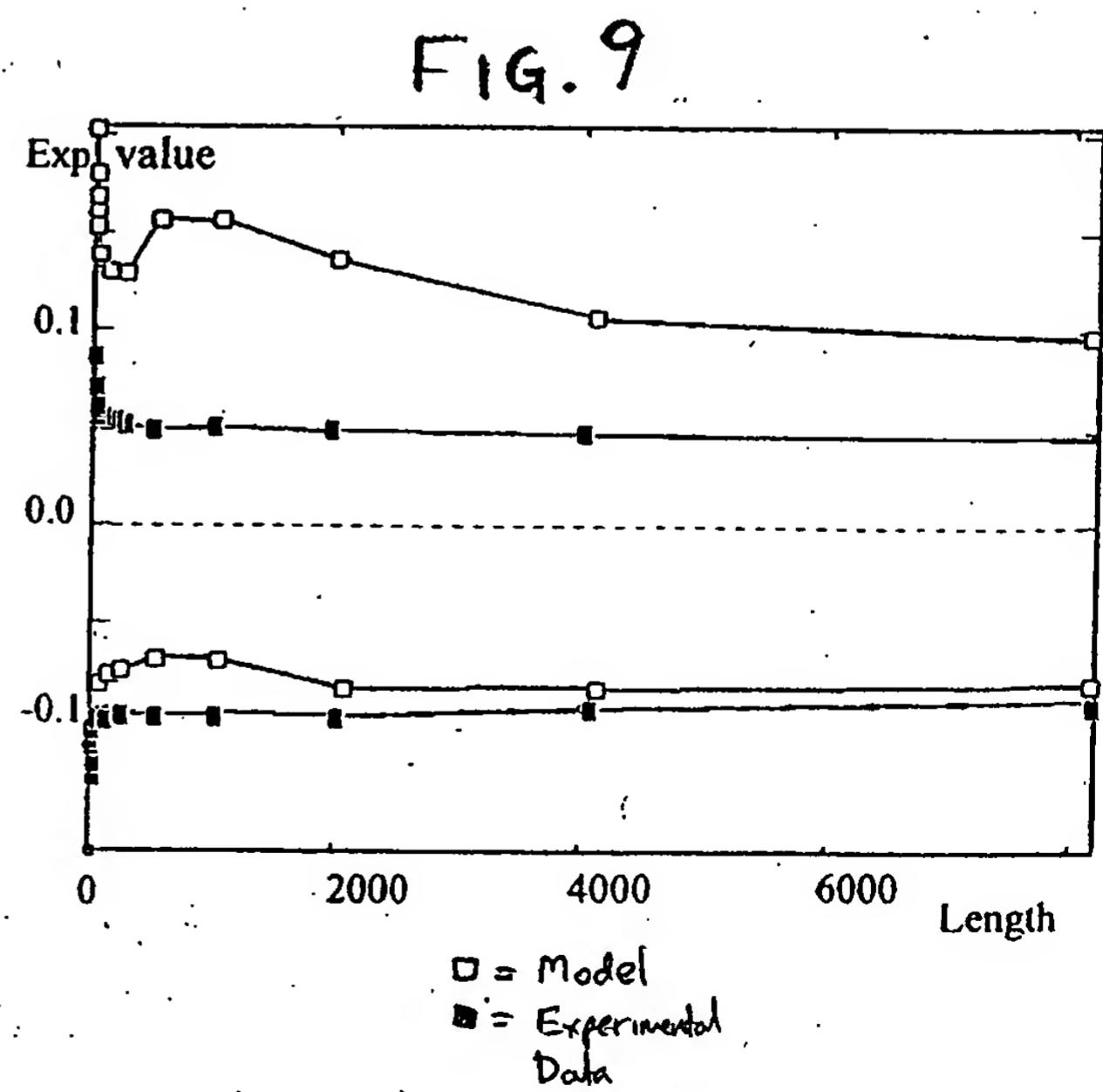
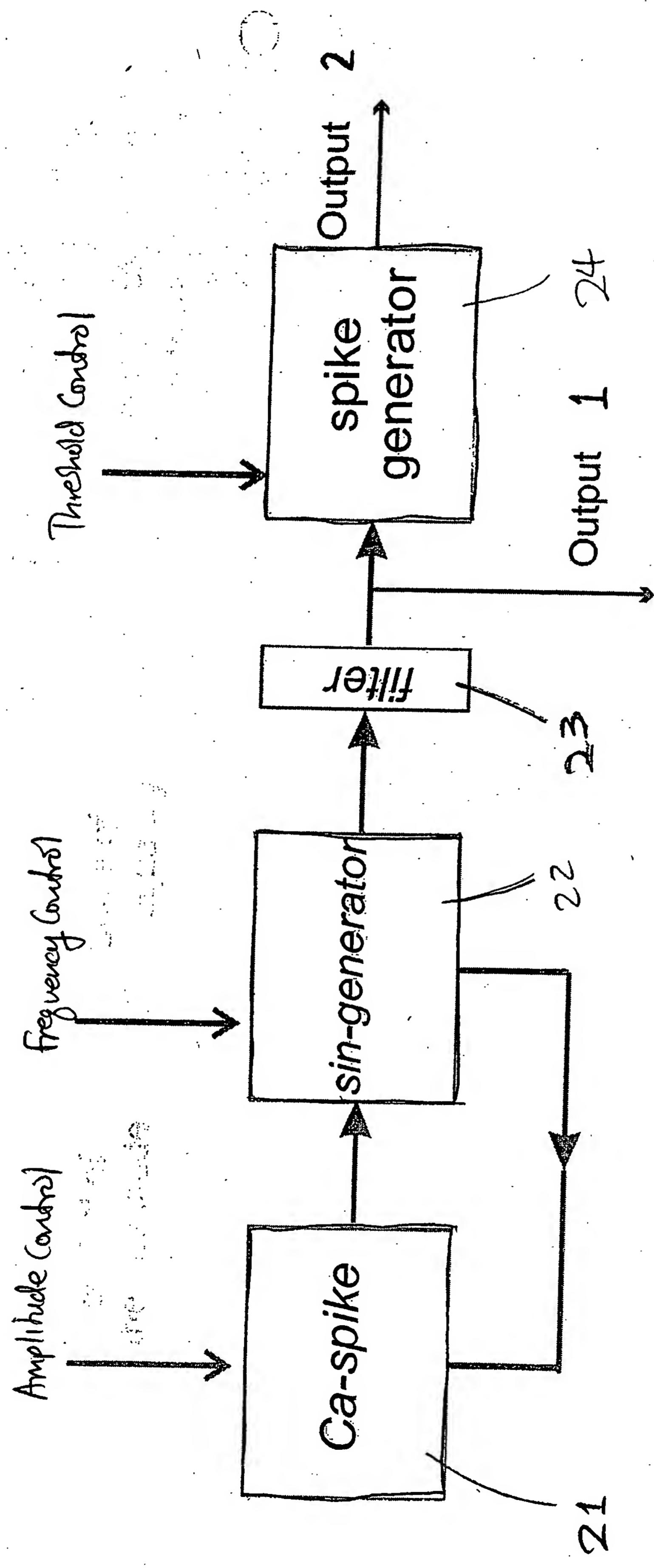


FIG. 8C



□ = Model  
■ = Experimental Data

Block-diagram of the circuit



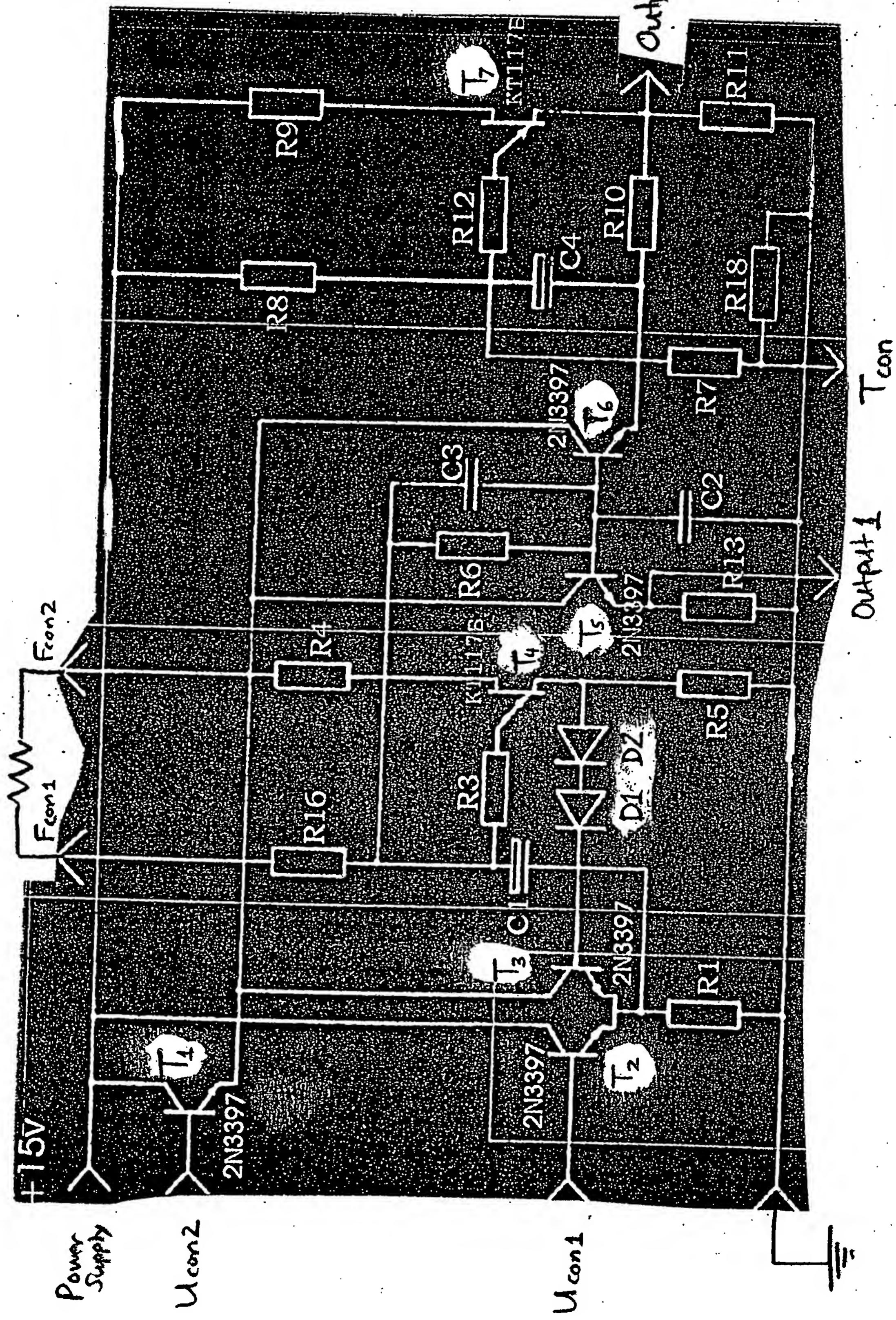


FIG. 11

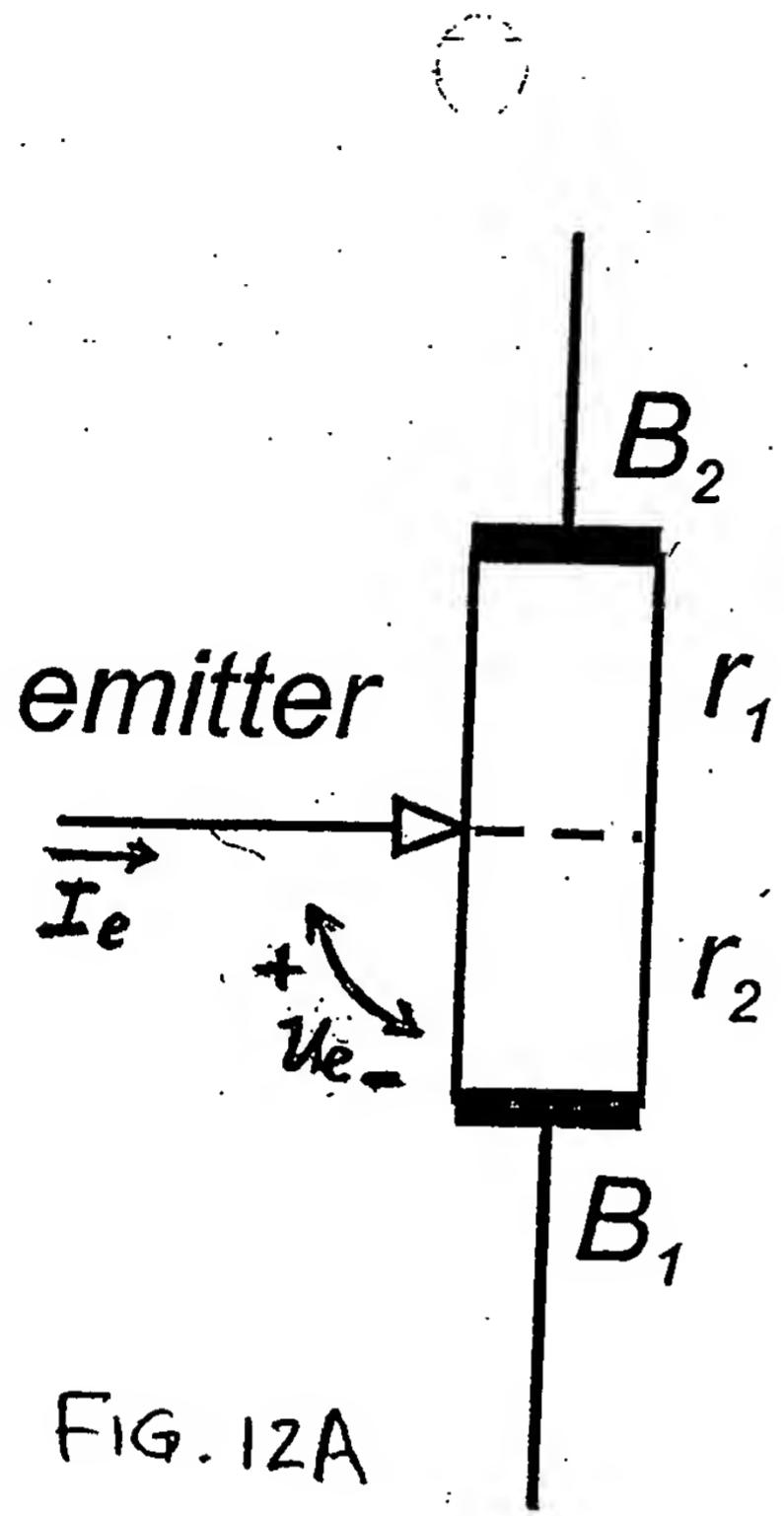


FIG. 12A

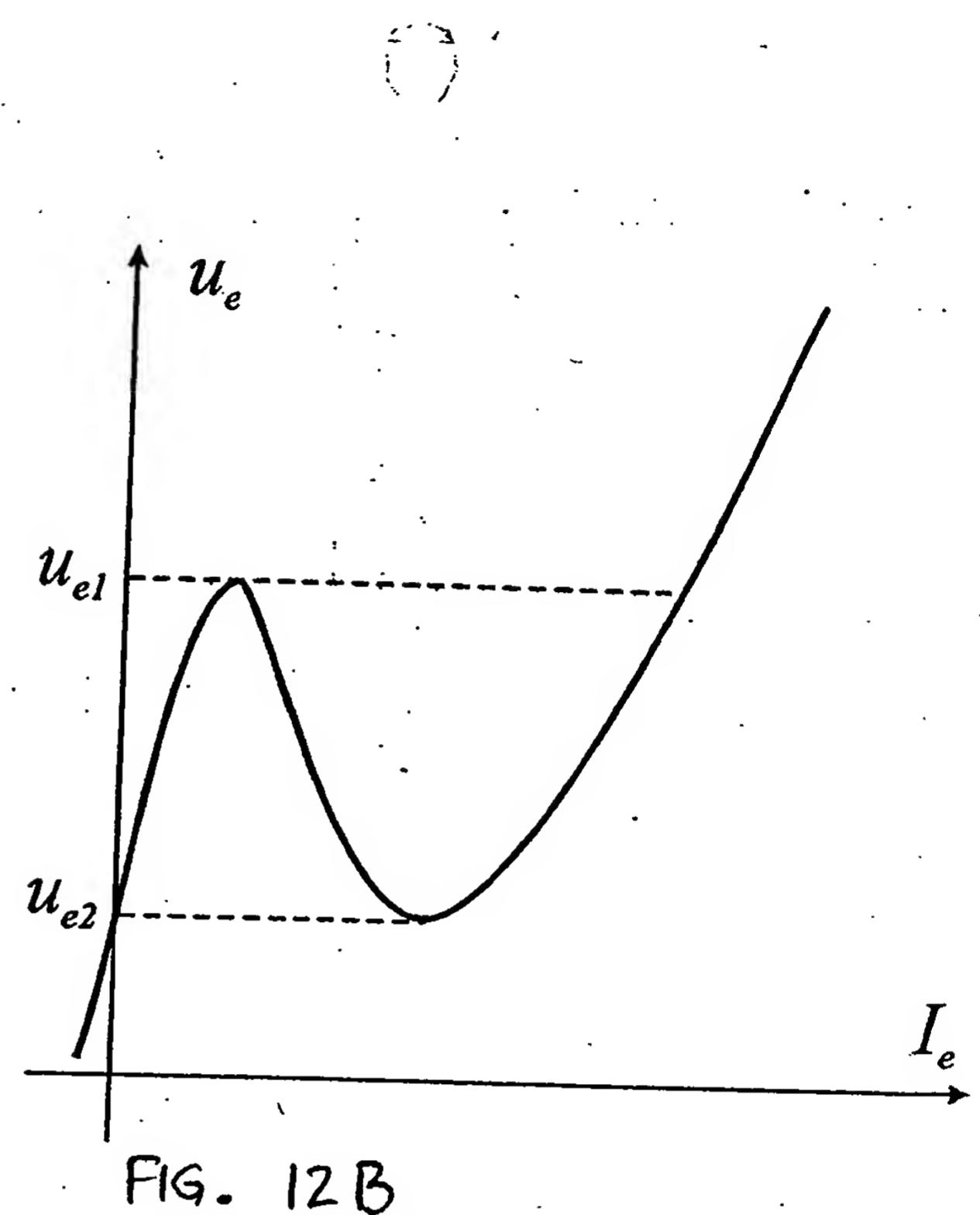


FIG. 12B

## Two chip experiments

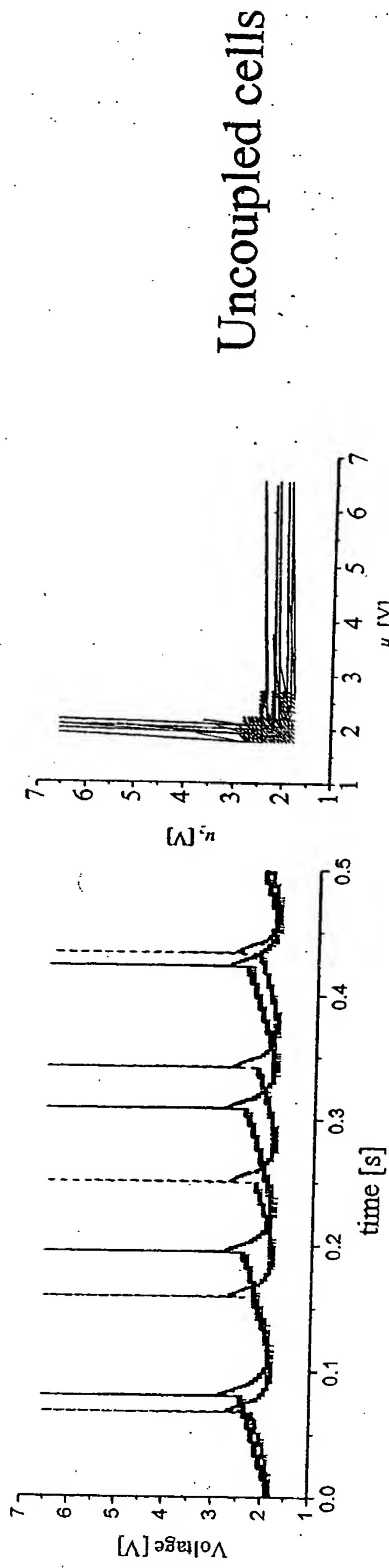


FIG. 13A



FIG. 13B

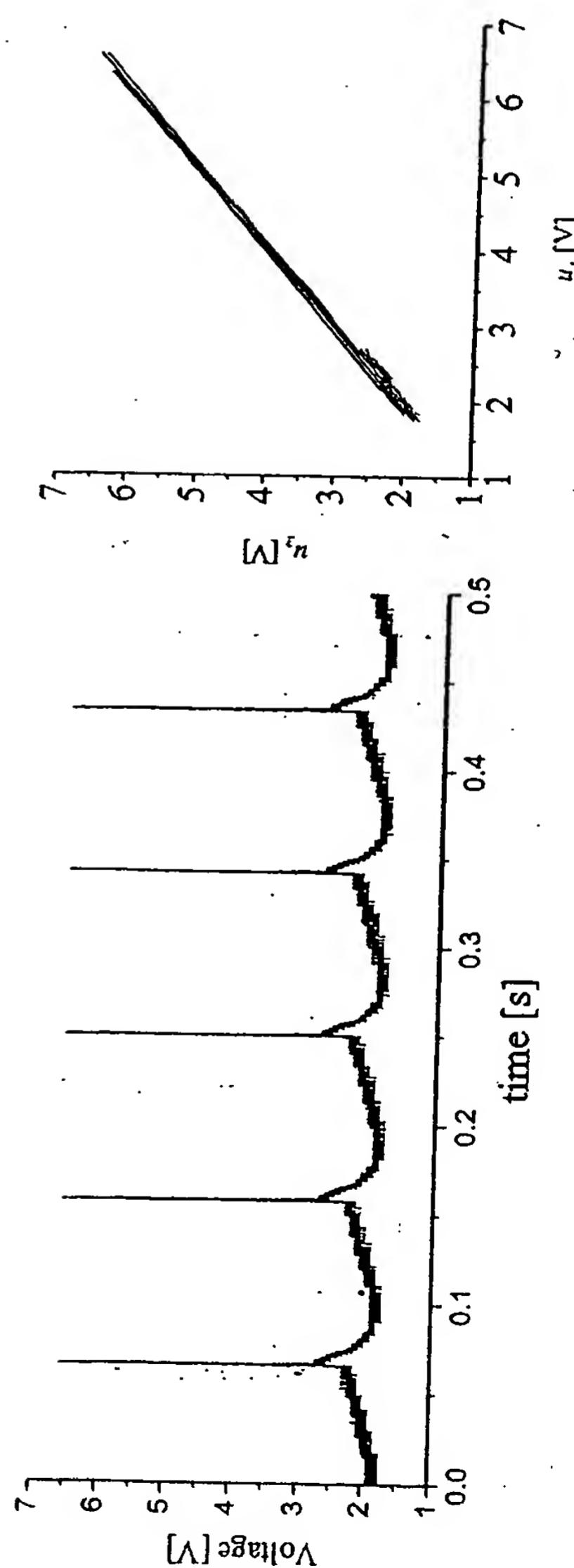


FIG. 13C

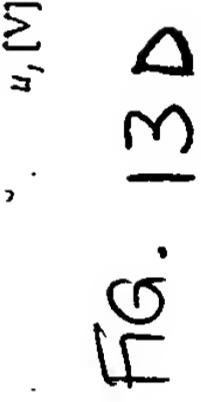


FIG. 13D

Uncoupled cells

Synchronization

# Synchronous and asynchronous spiking

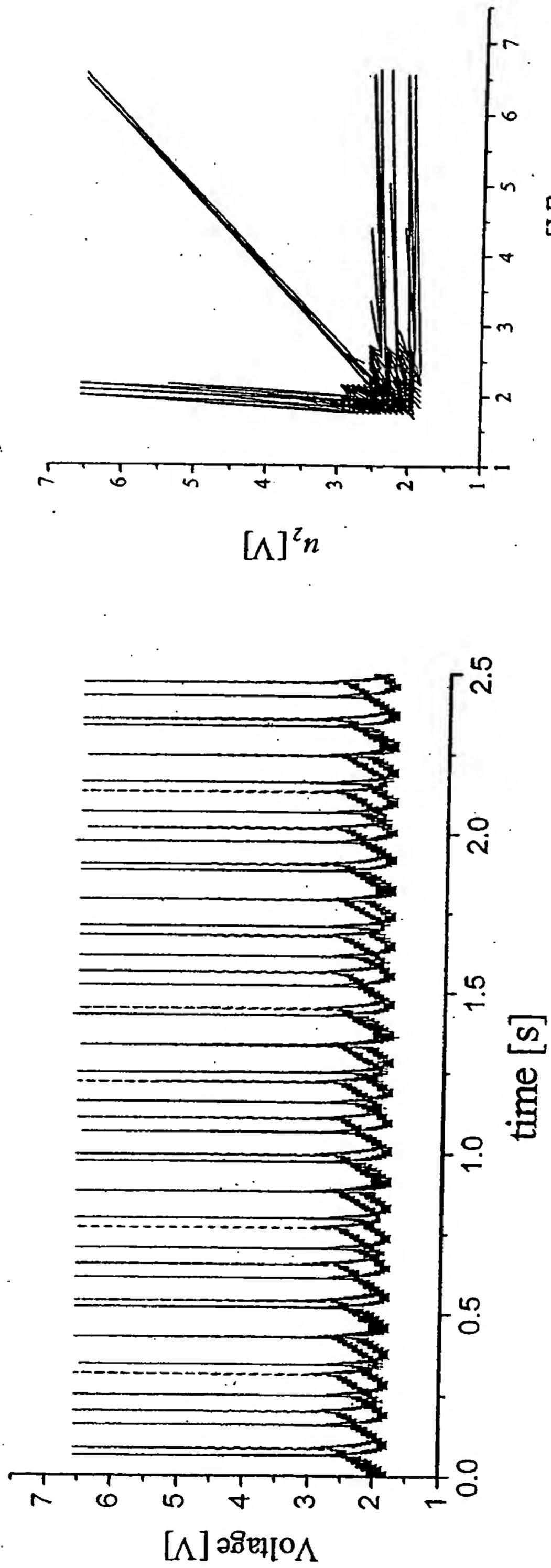


Fig. 14A

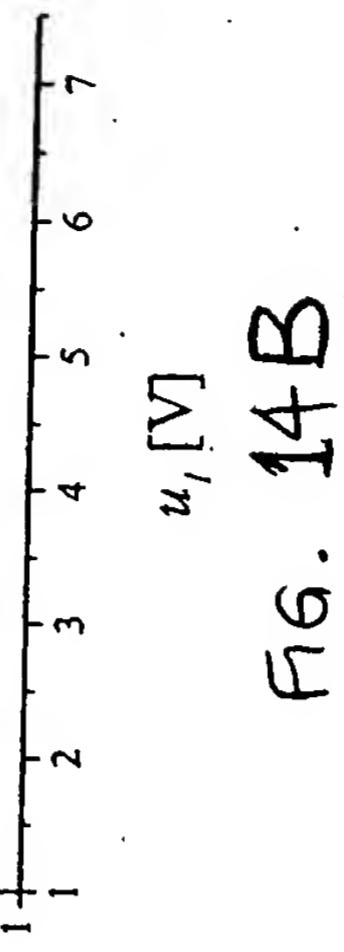
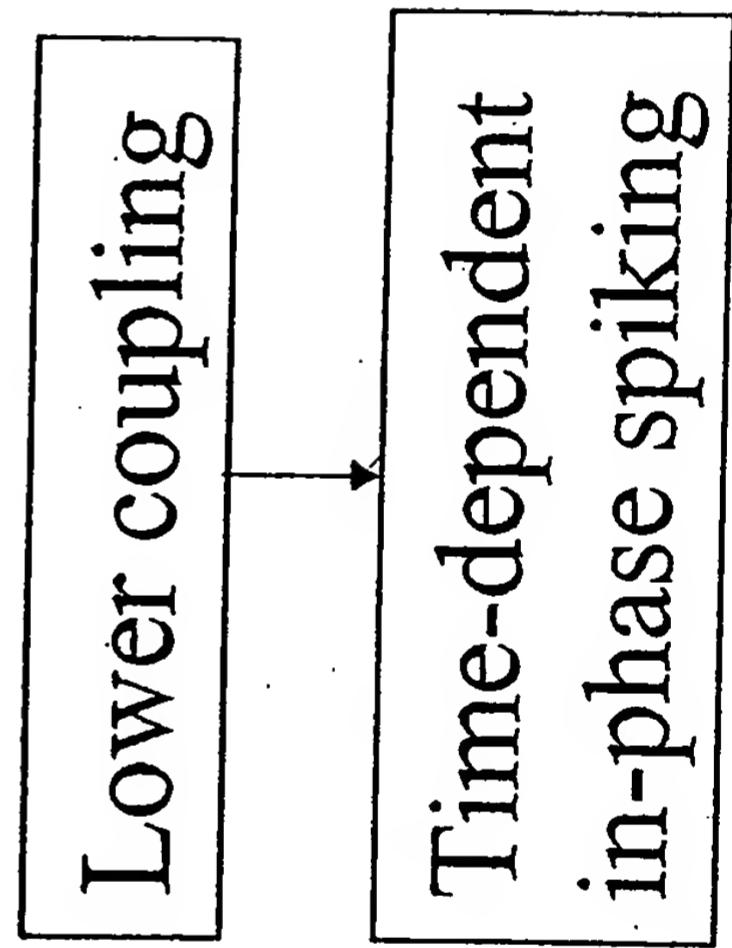


Fig. 14B



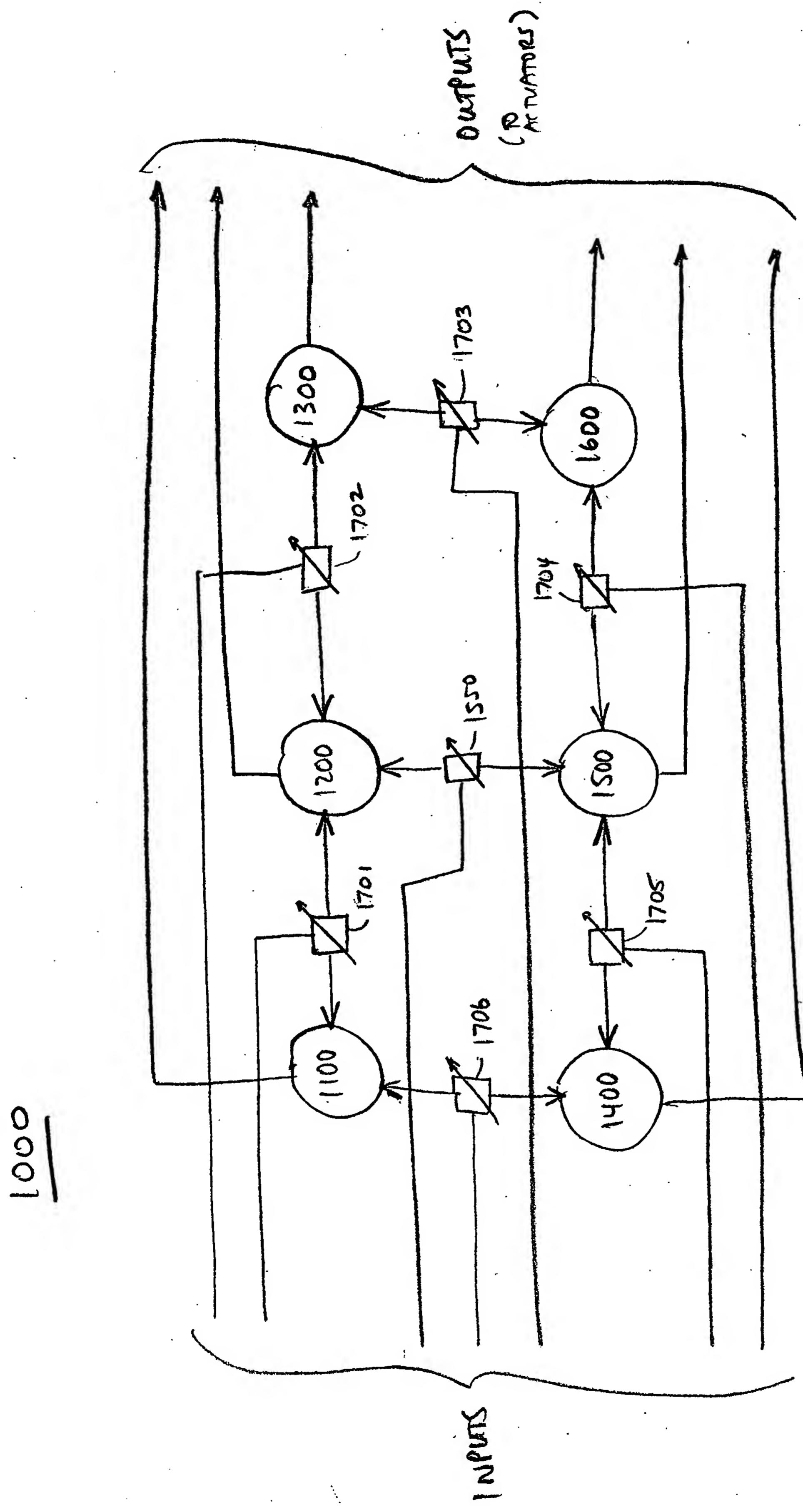


Fig. 15

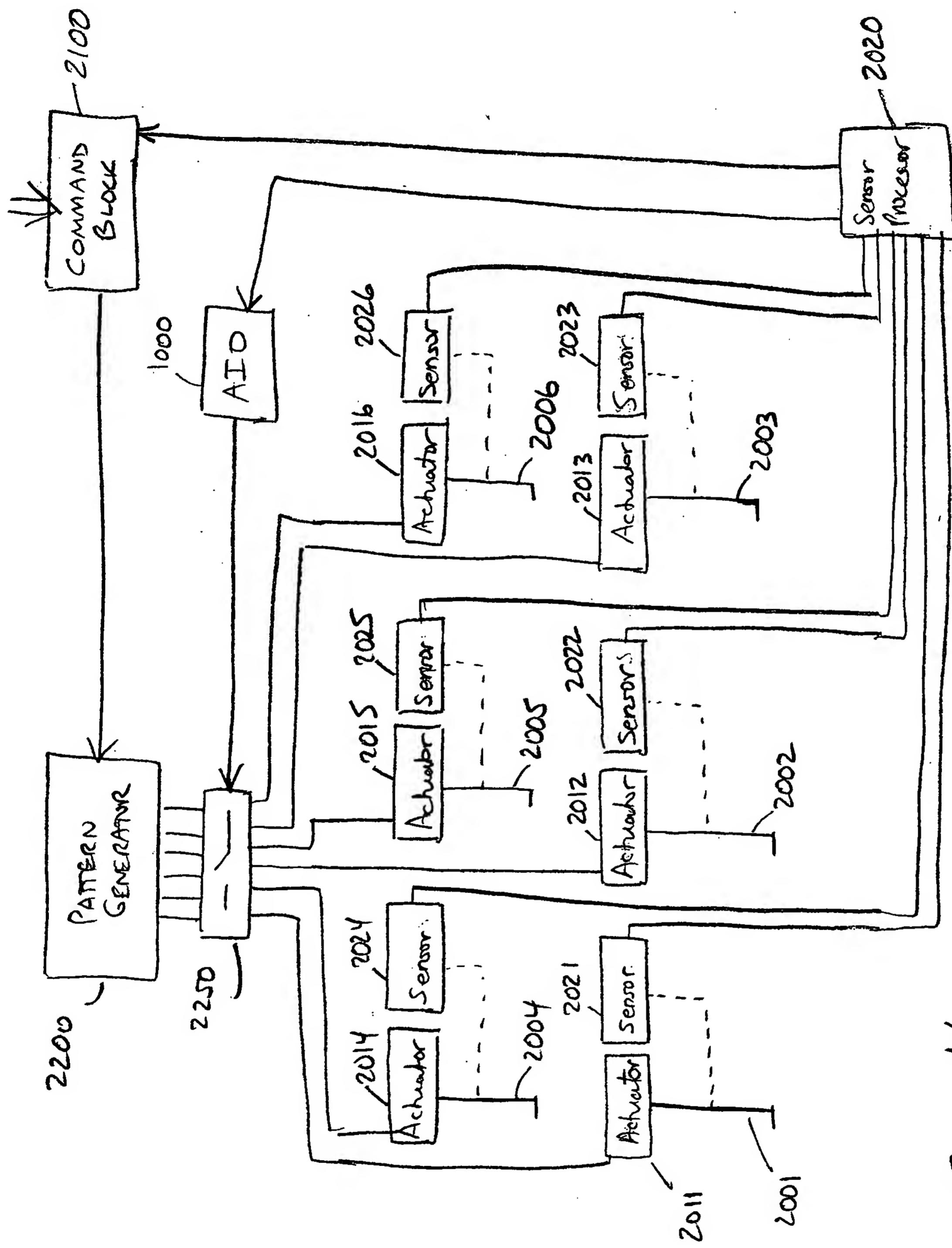


FIG. 16

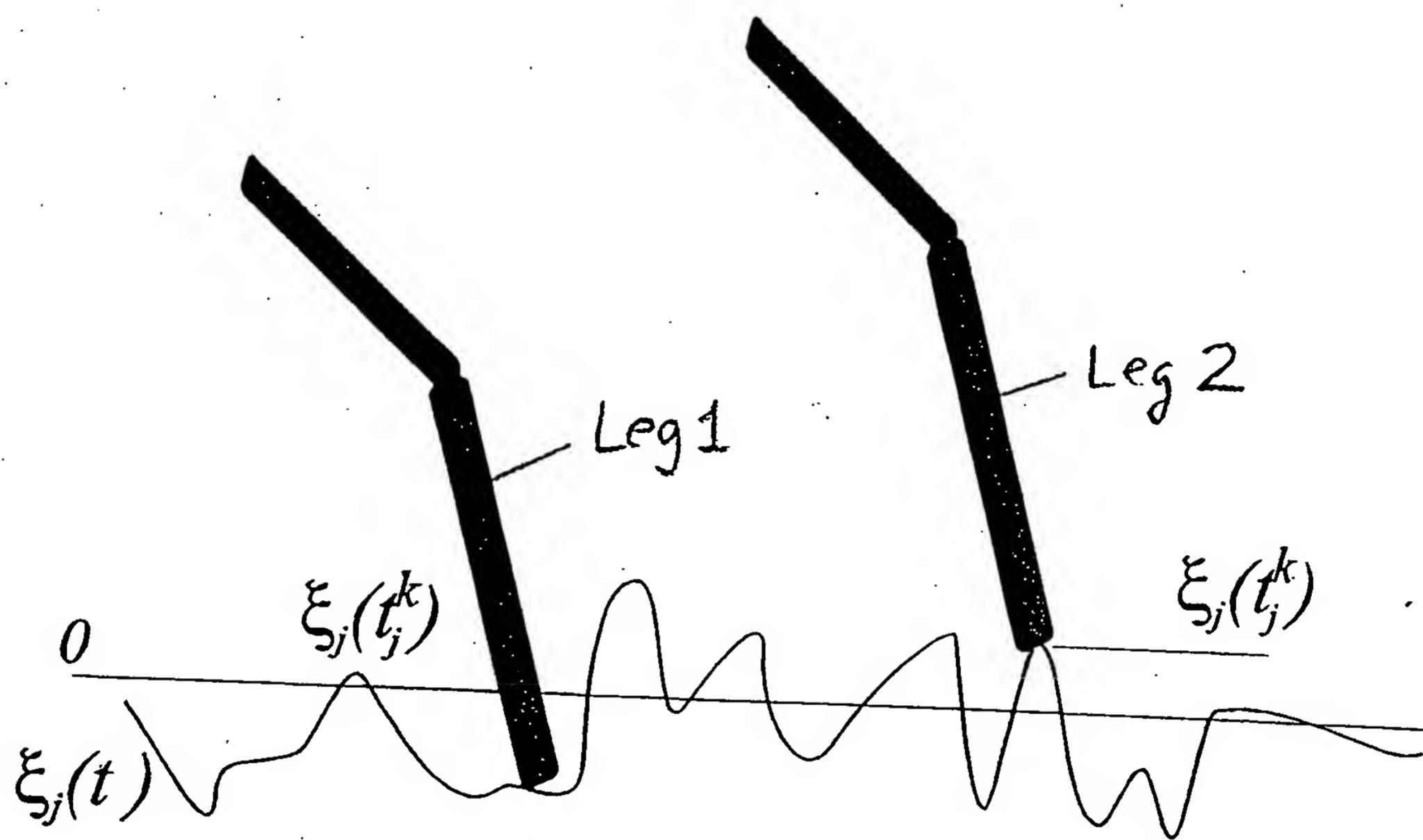
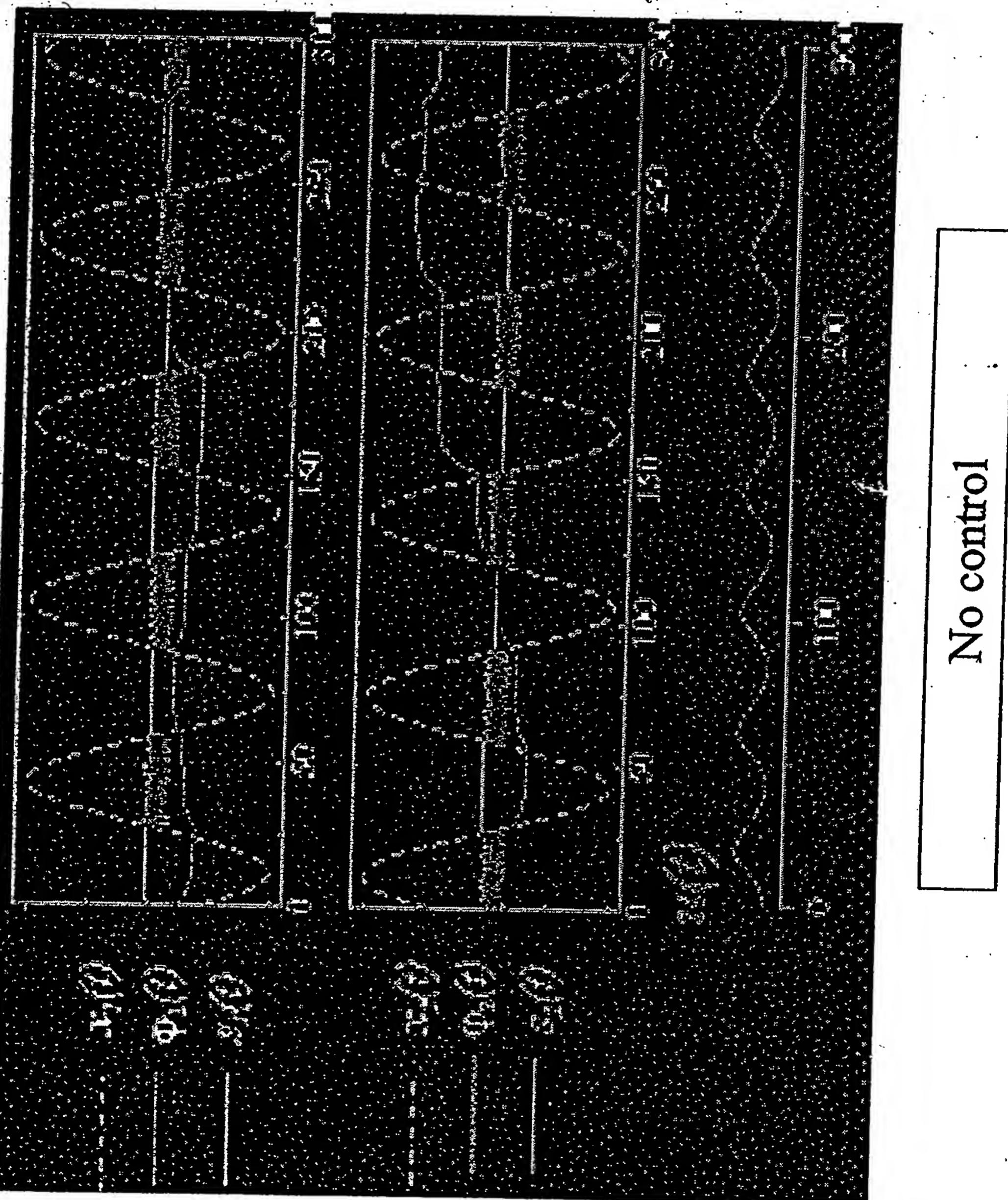


FIG. 17

## Global phase coordination



# Coordination with discrete control

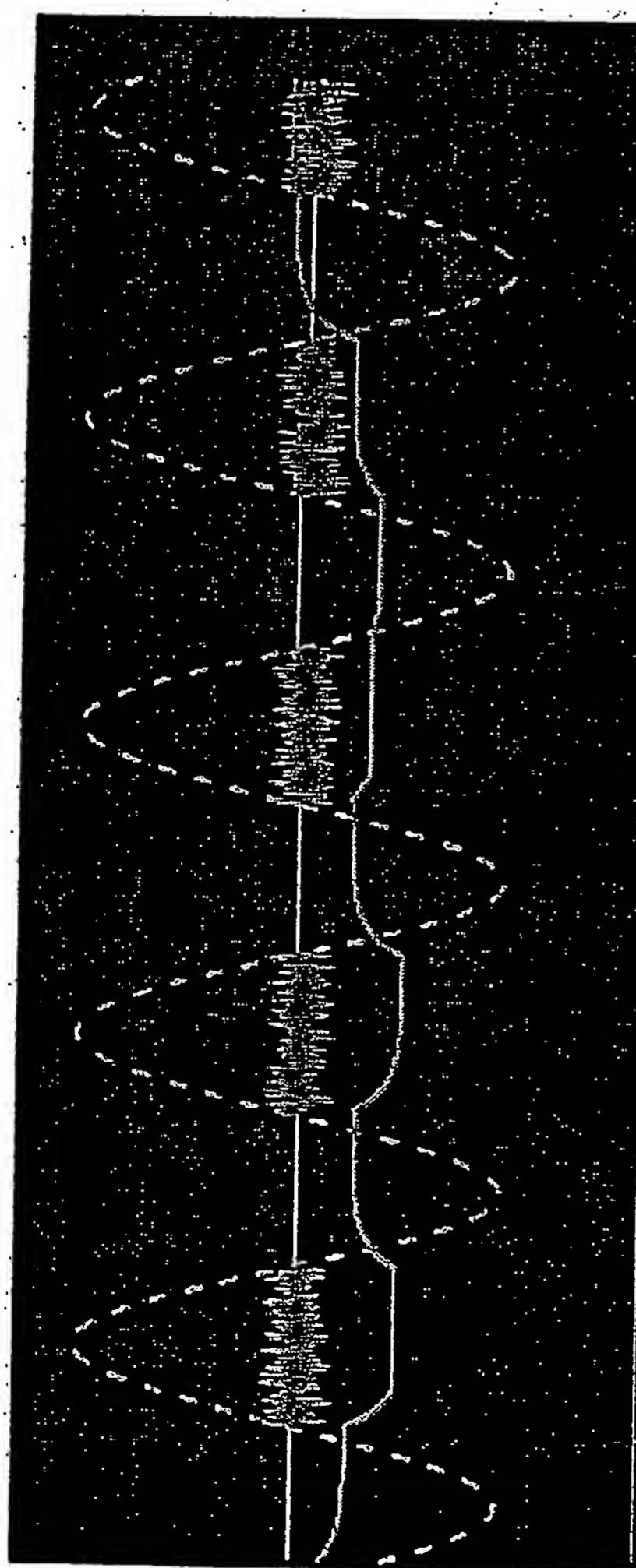


FIG.  
19 A

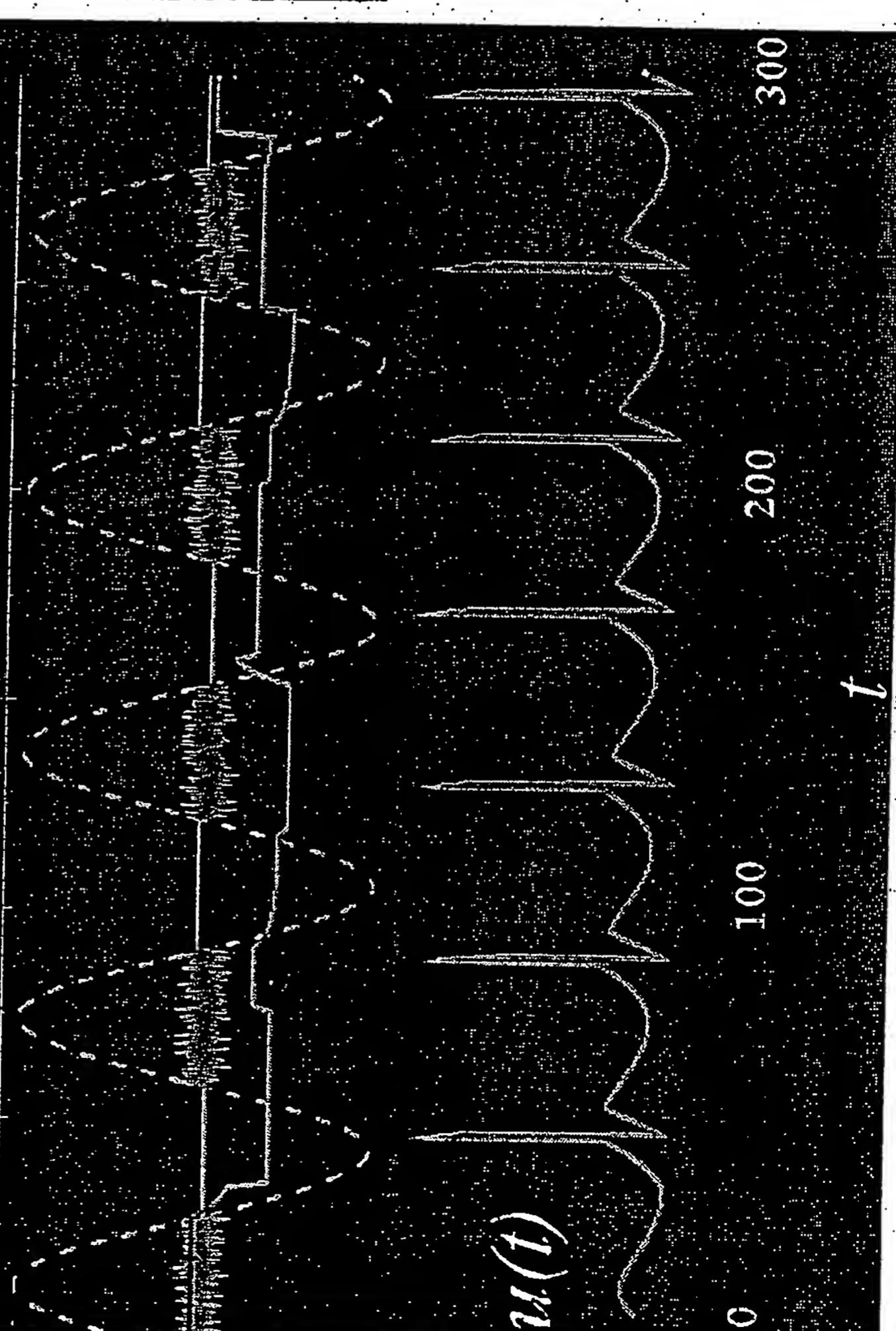


FIG.  
19 B

The control signal recovers  
the correct phase shift  
relations

FIG.  
19 C

## *Evolution of phases*

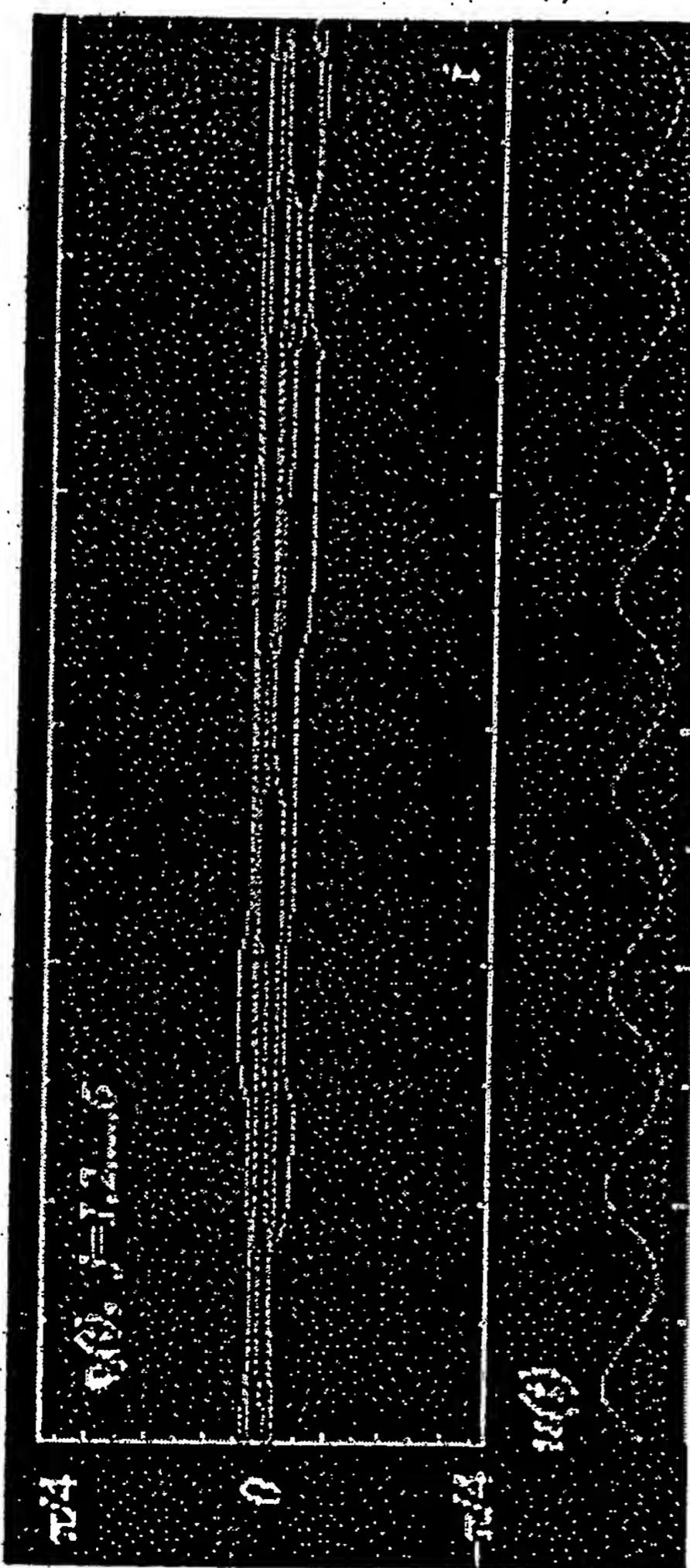


FIG.  
20A

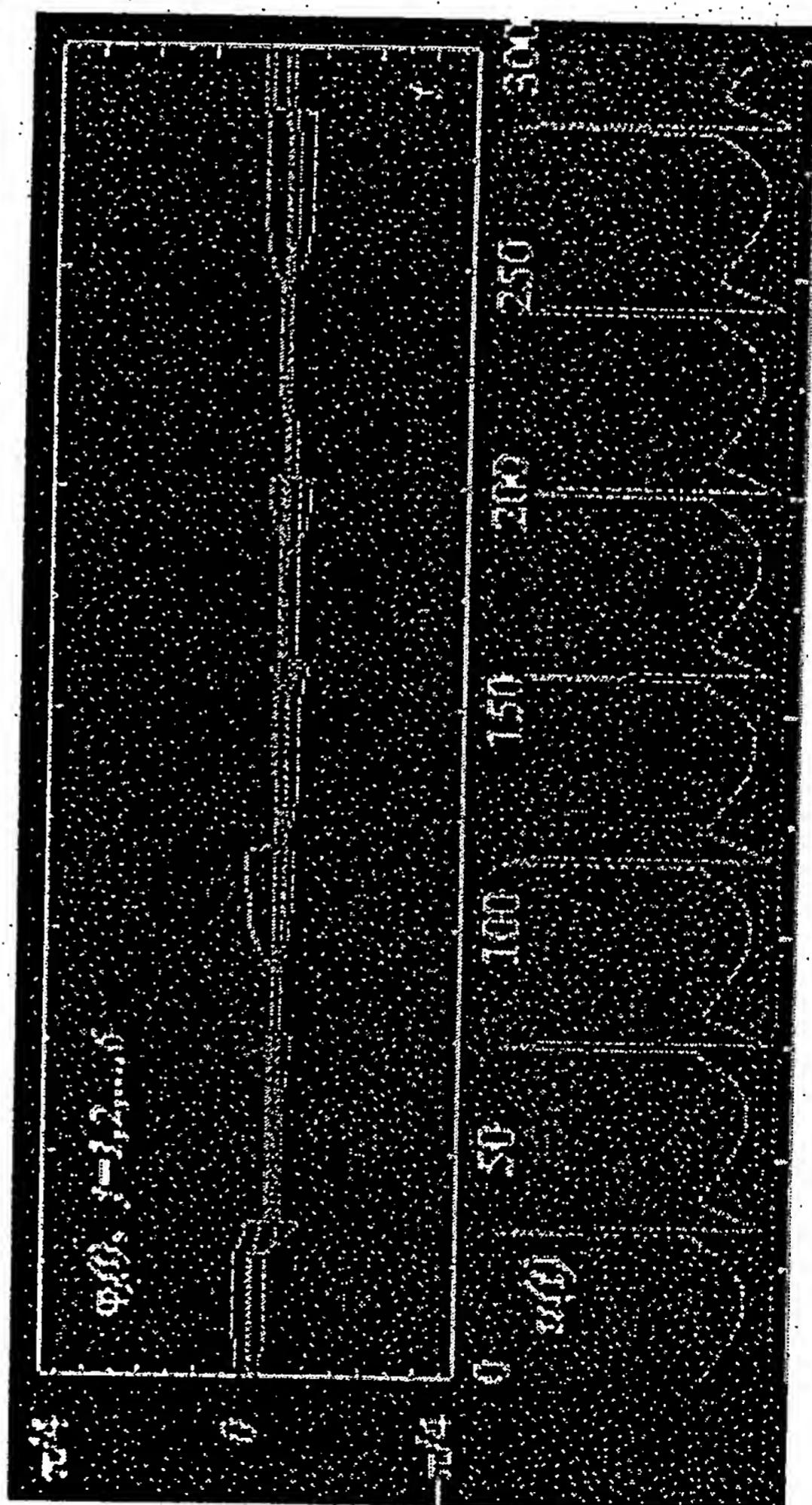


FIG.  
20B

No control - phases evolve according to self-tuning mechanisms

Discrete control - the movement is controlled to sustain the walking gate

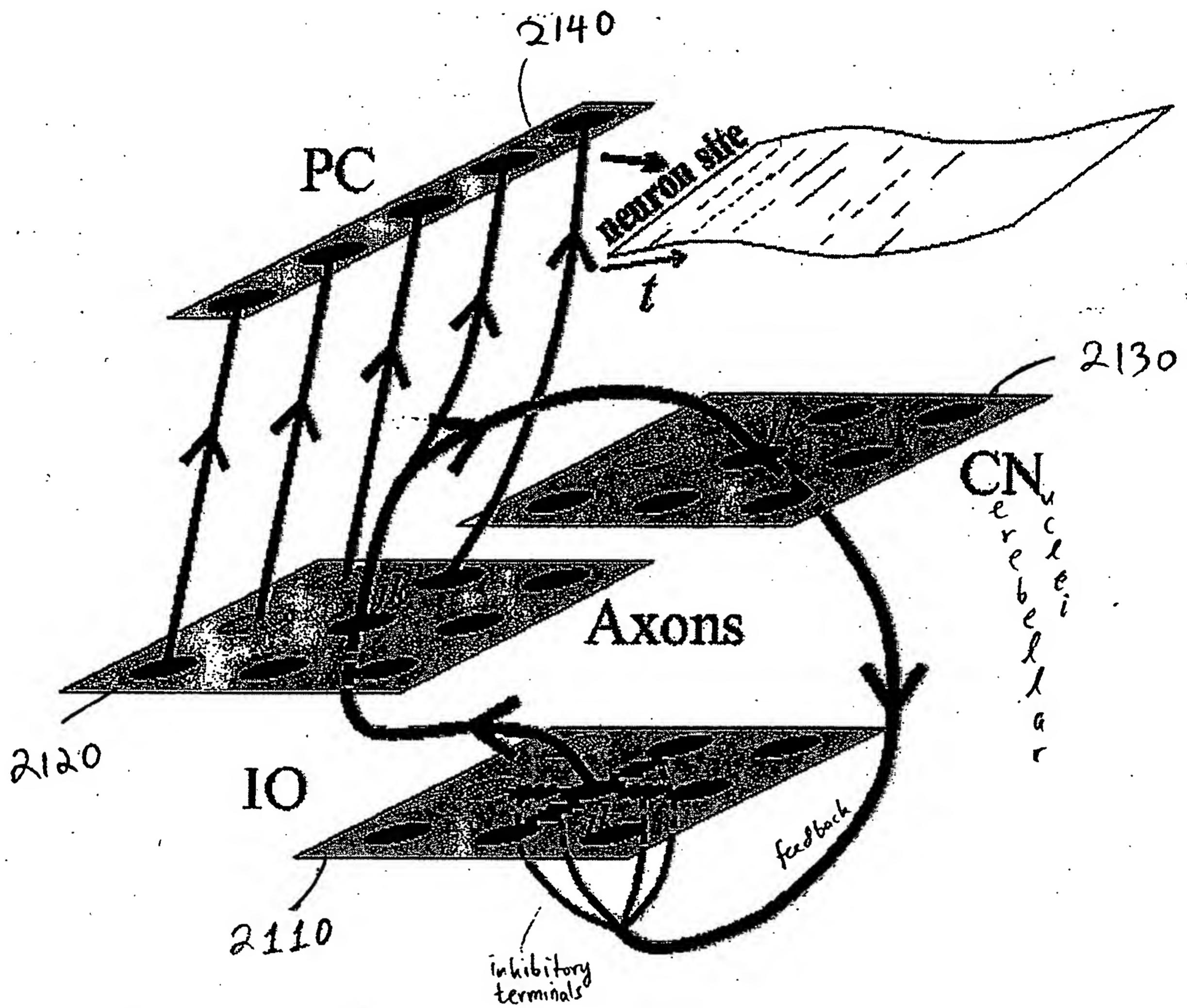


Figure 21

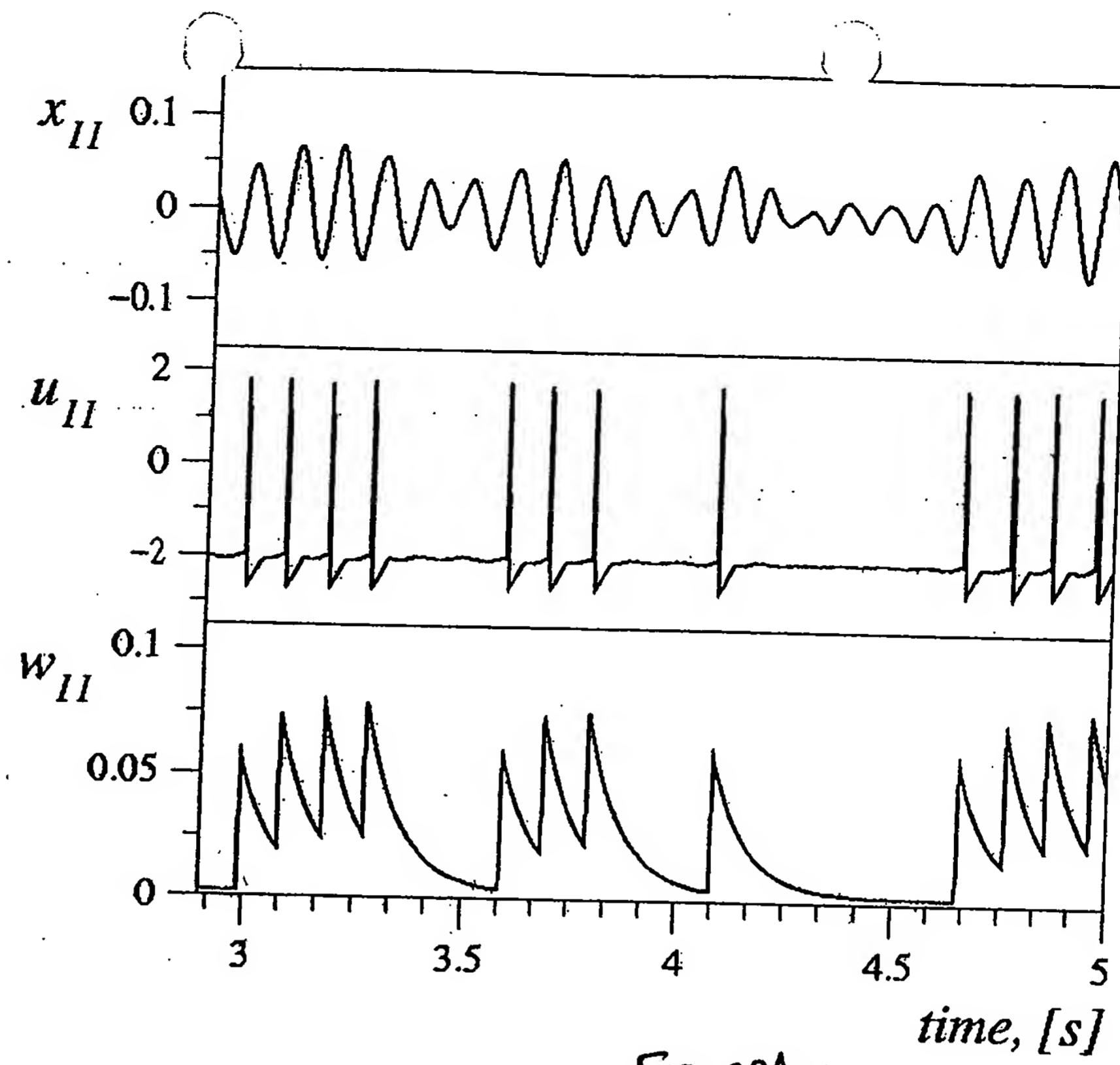


FIG. 22A

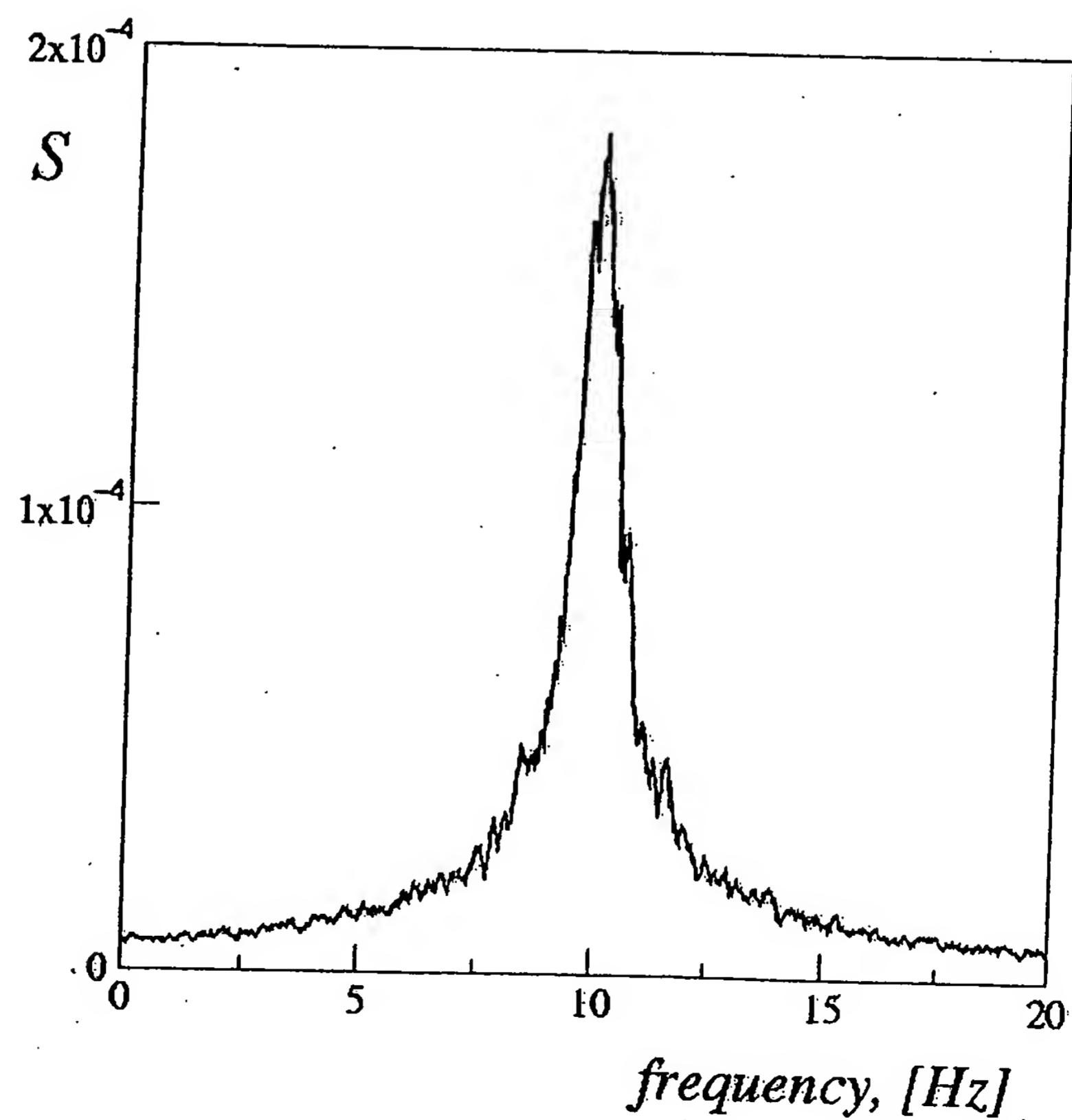


FIG. 22B

standard deviation

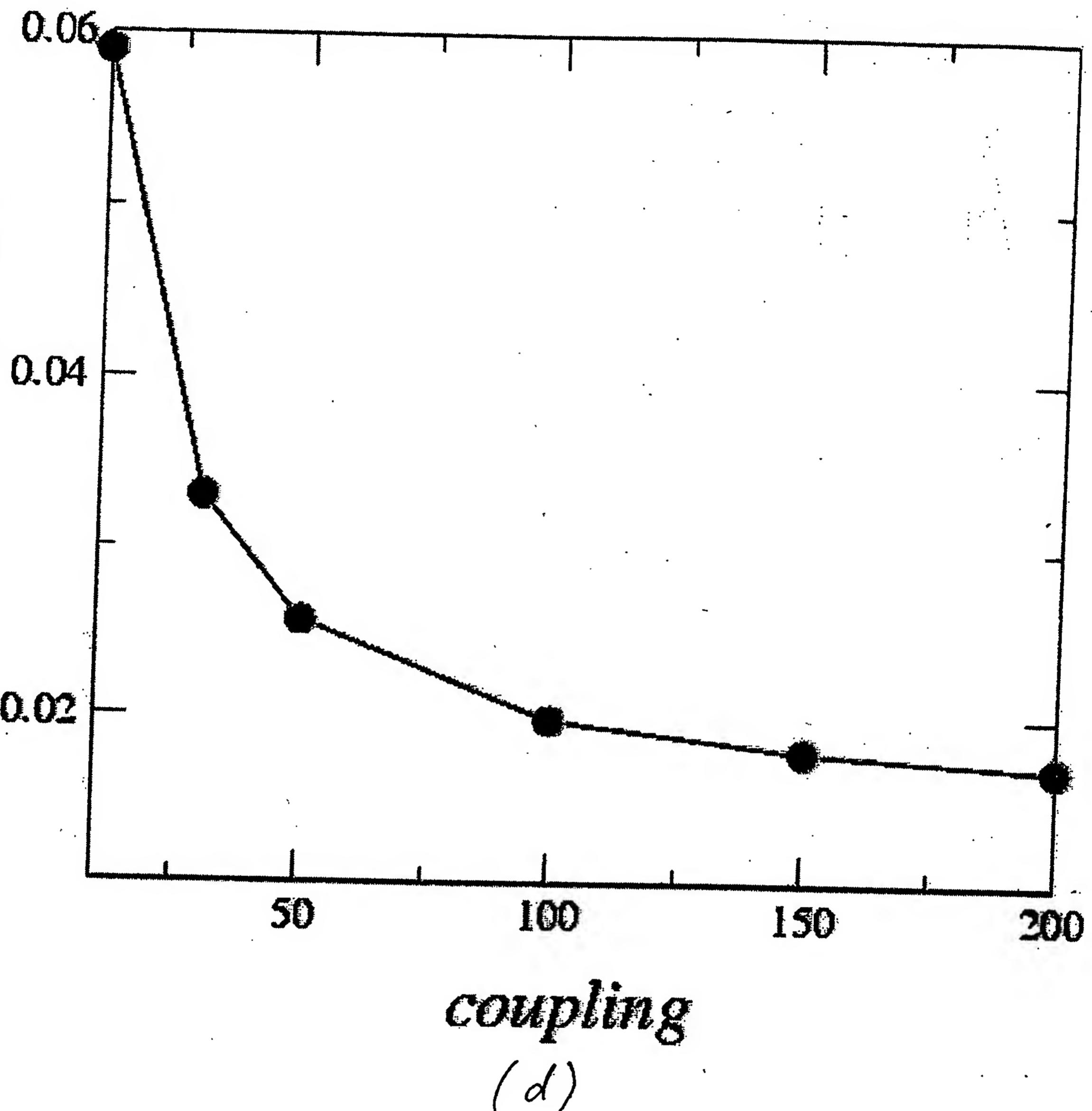


Figure 23

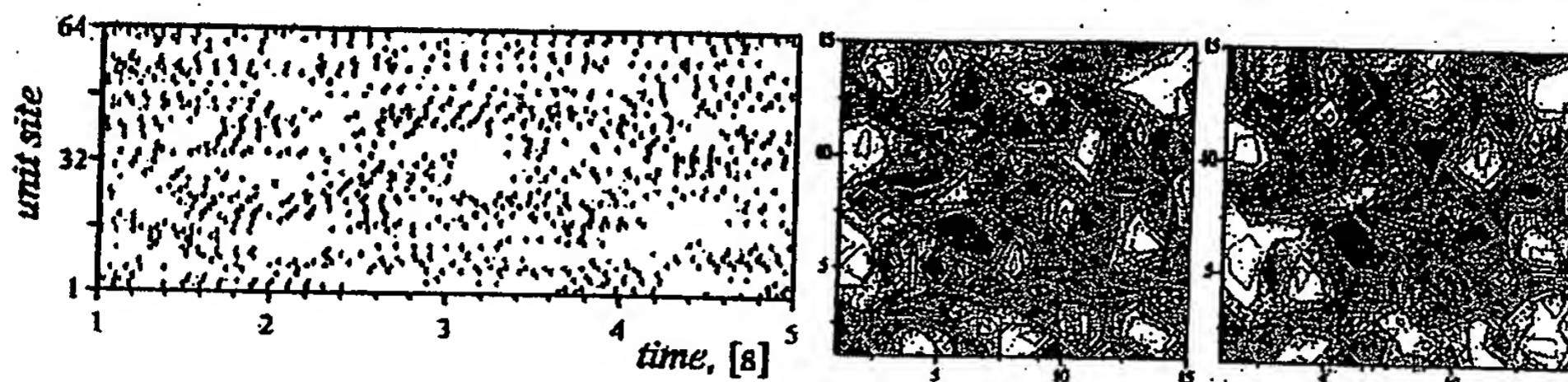


FIG. 24A

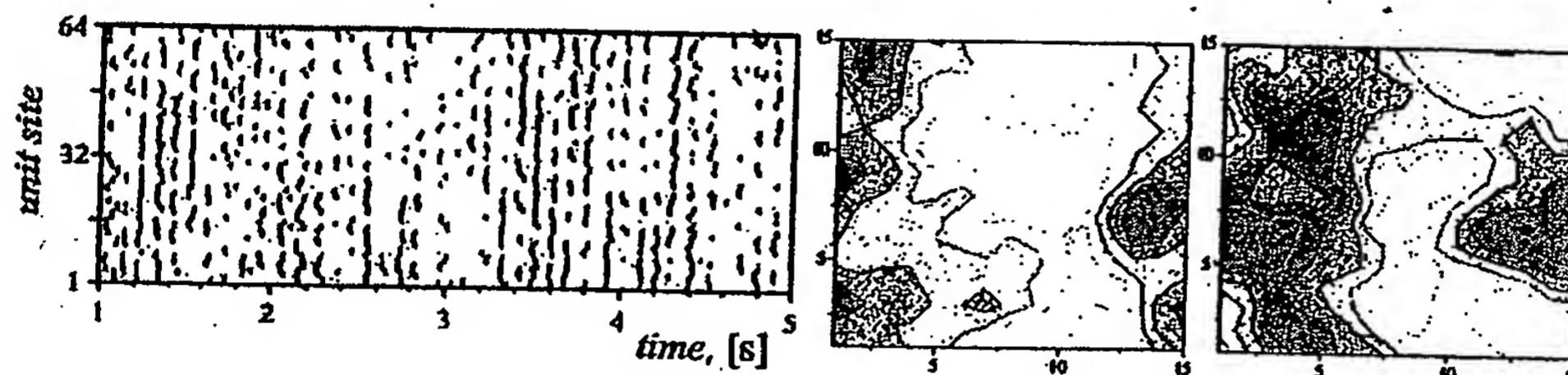


FIG. 24B

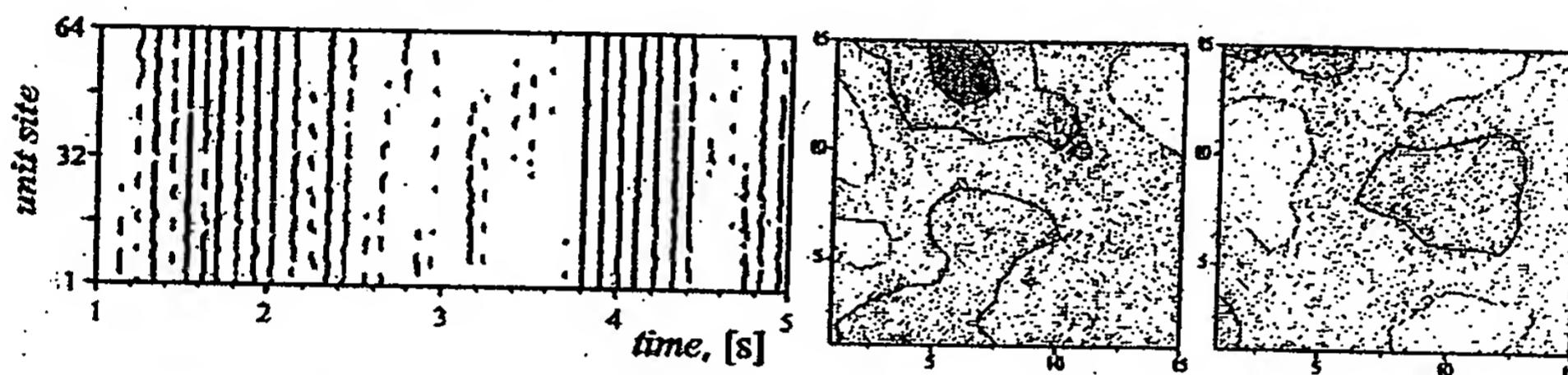


FIG. 24C

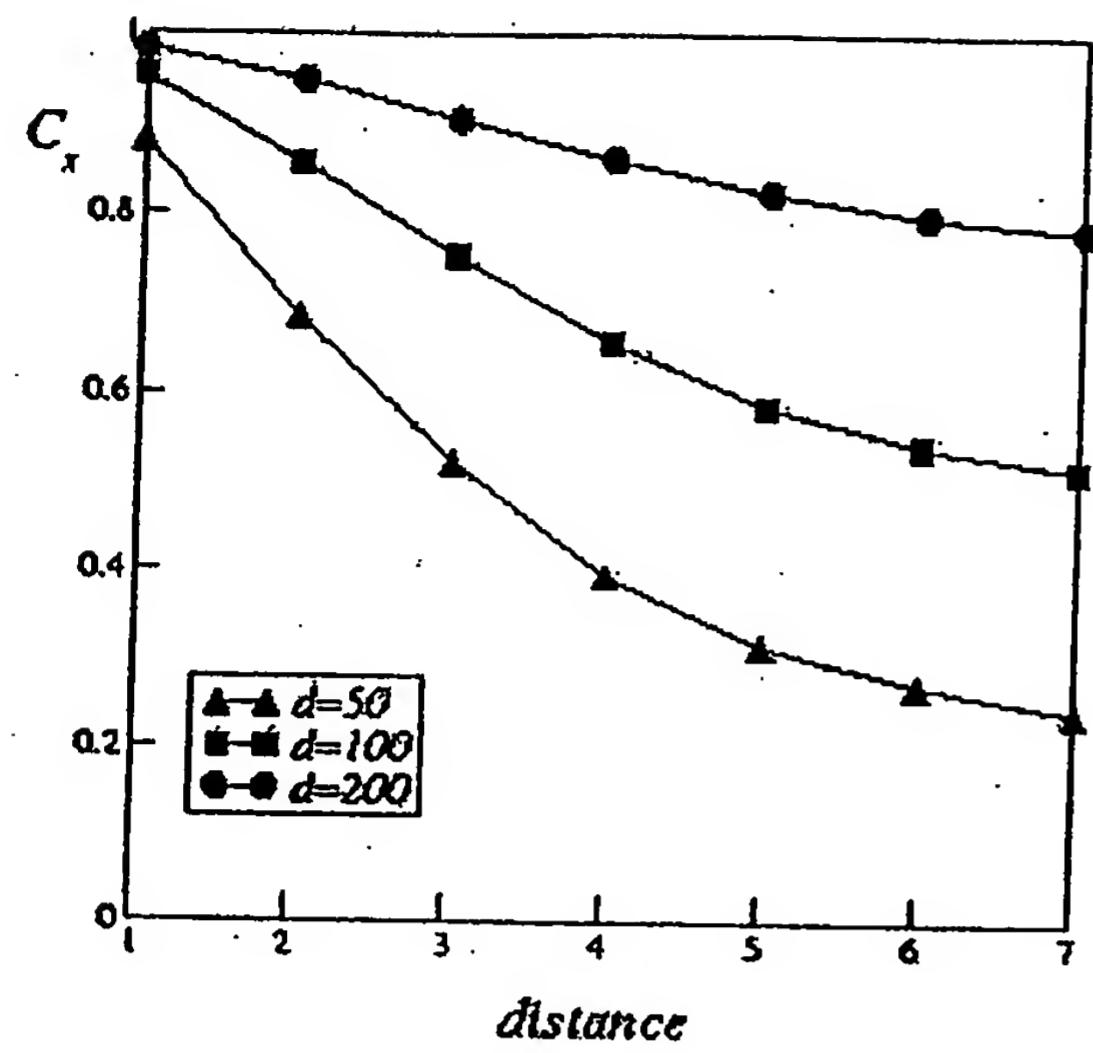


FIG. 25A

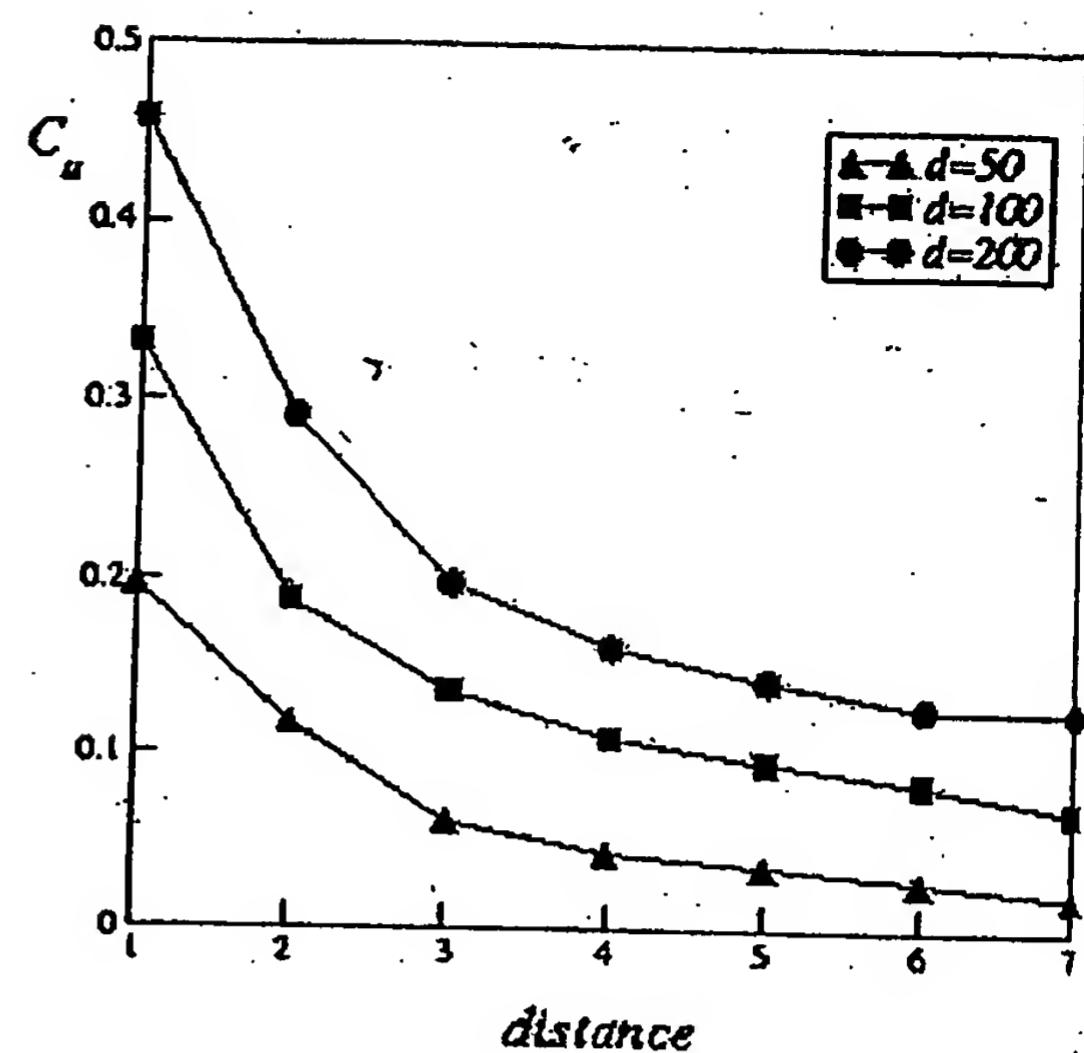
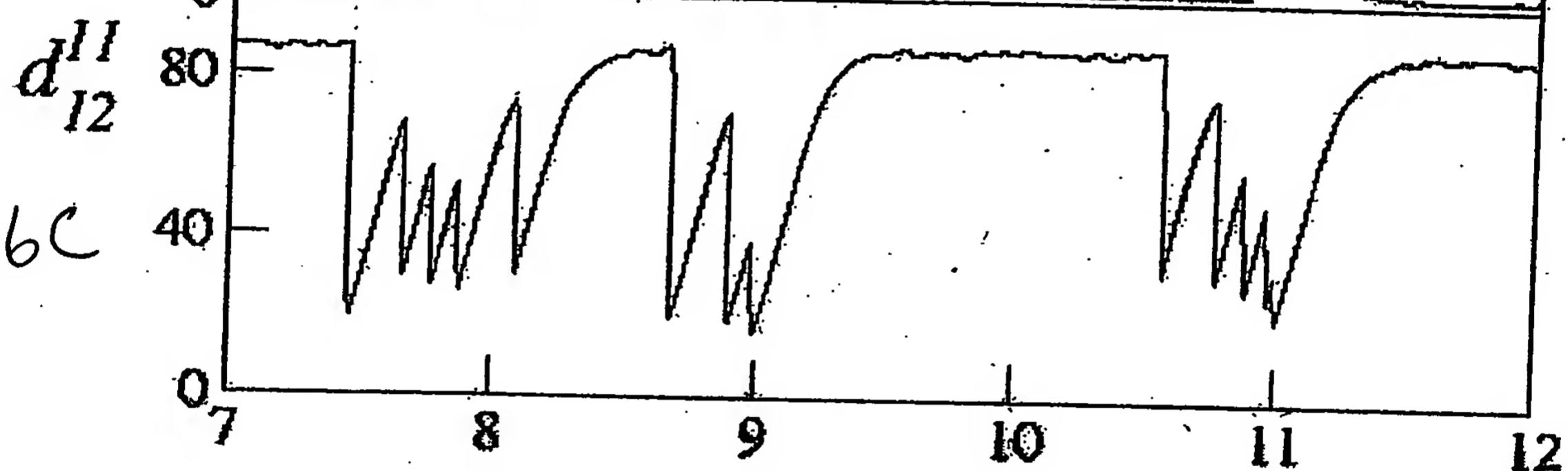
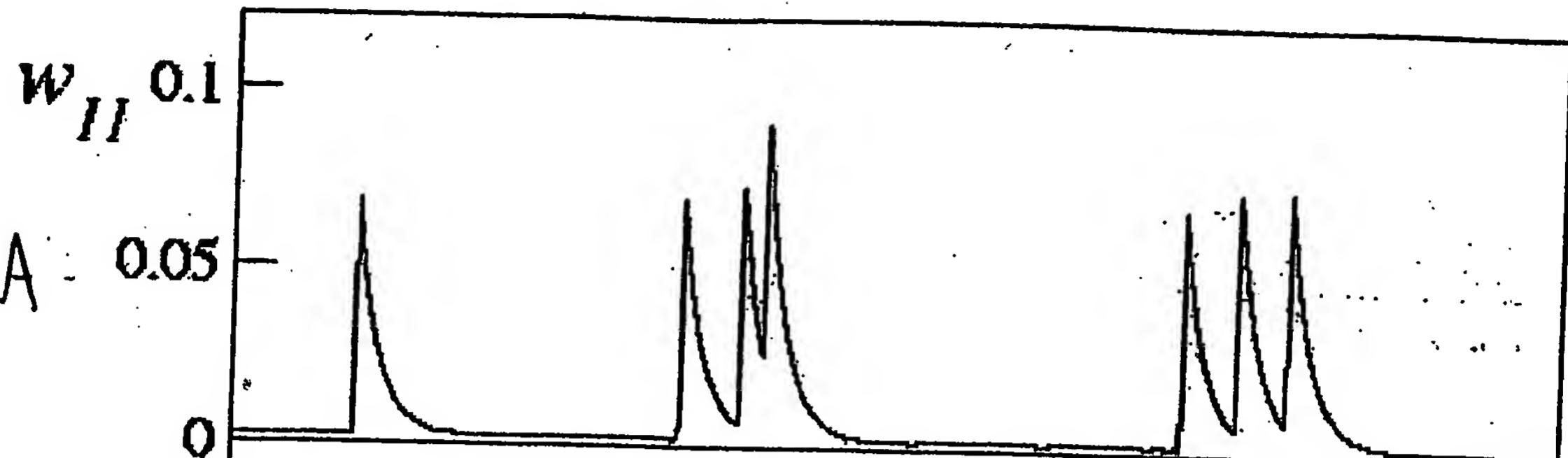


FIG. 25B



time [s]

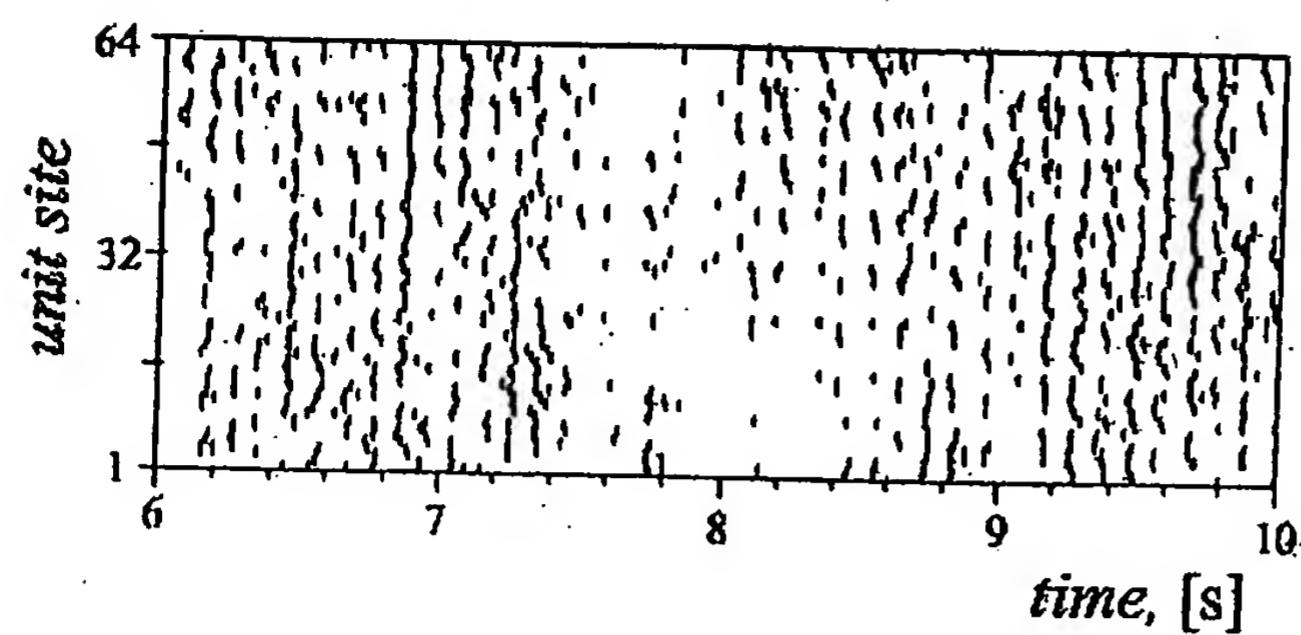


FIG. 27A

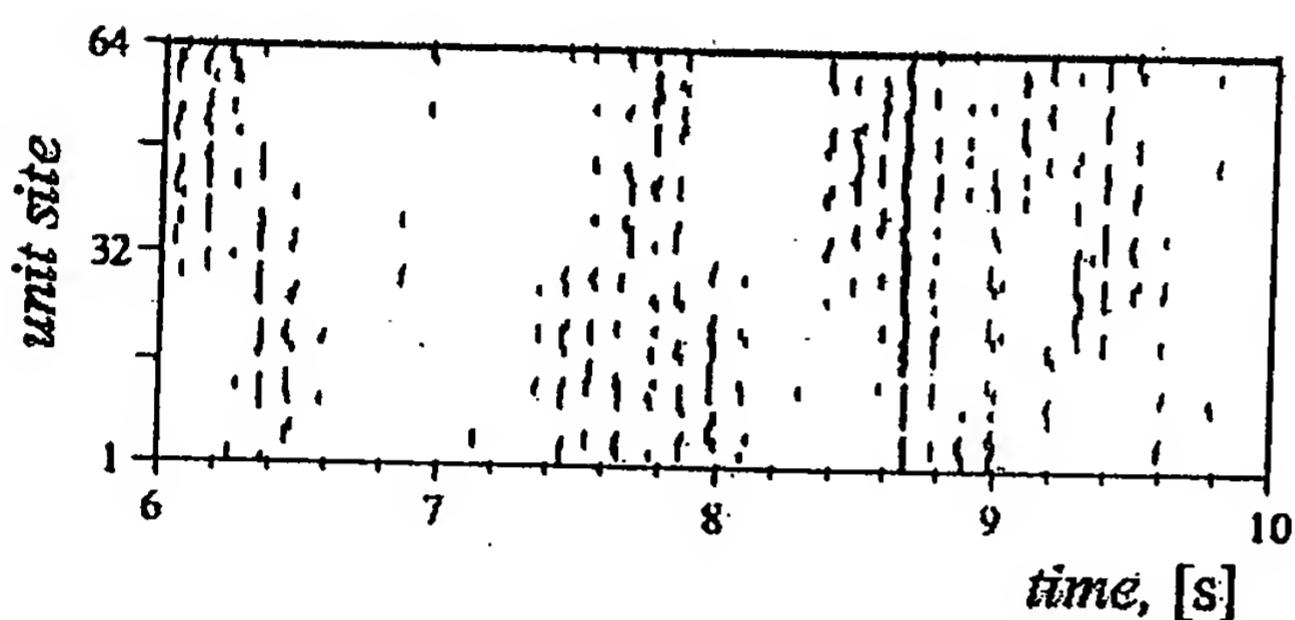


FIG. 27B

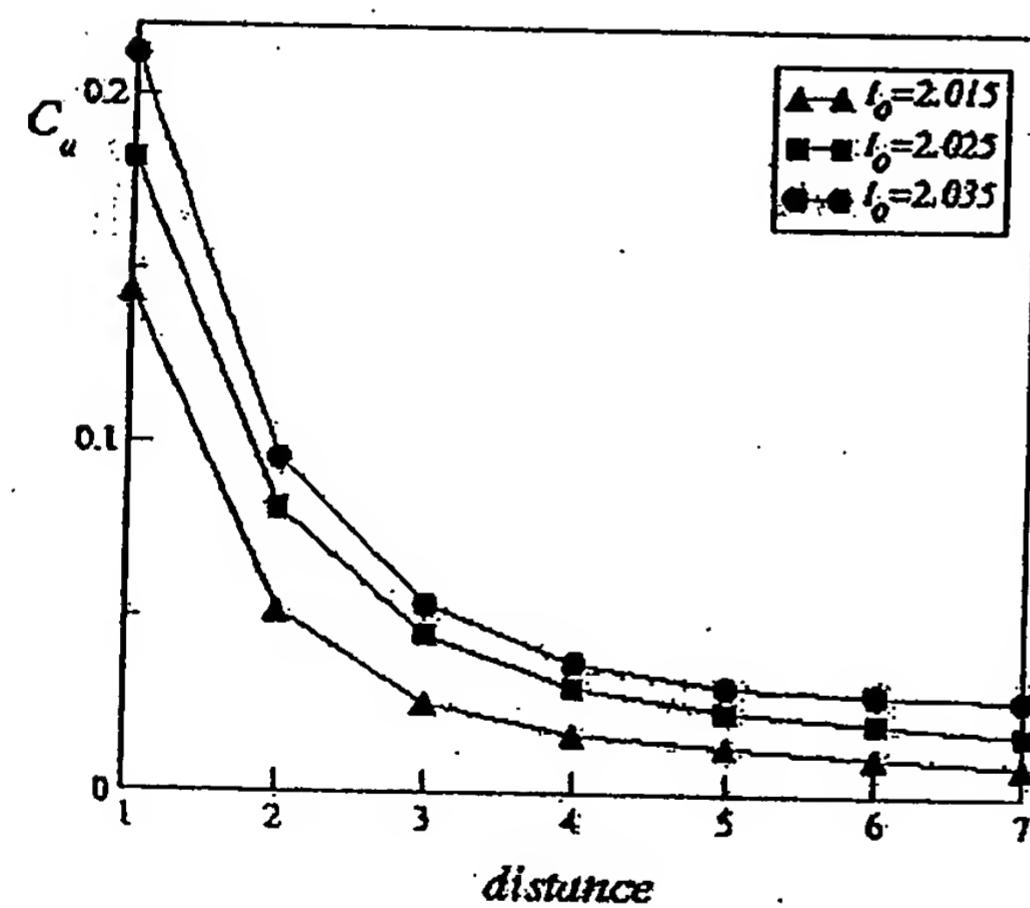
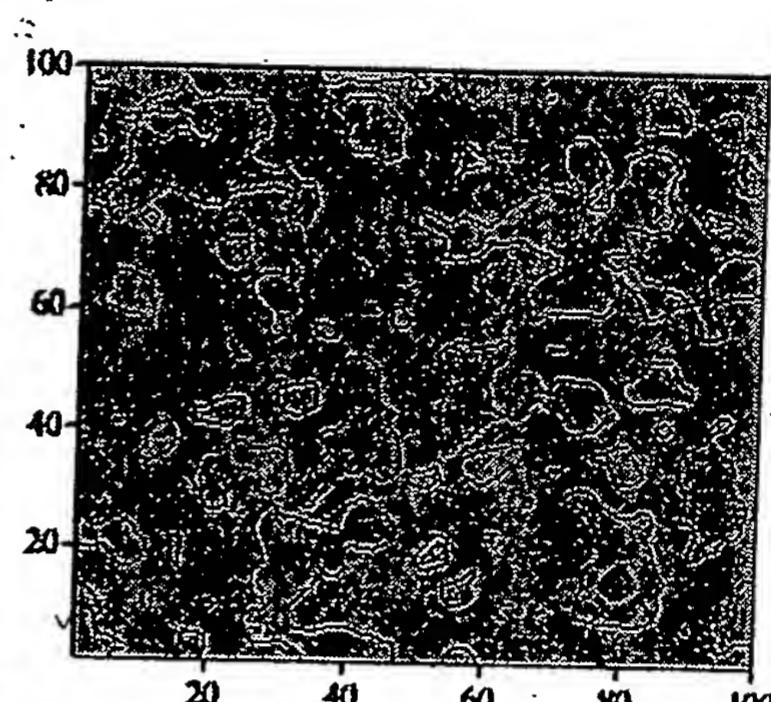
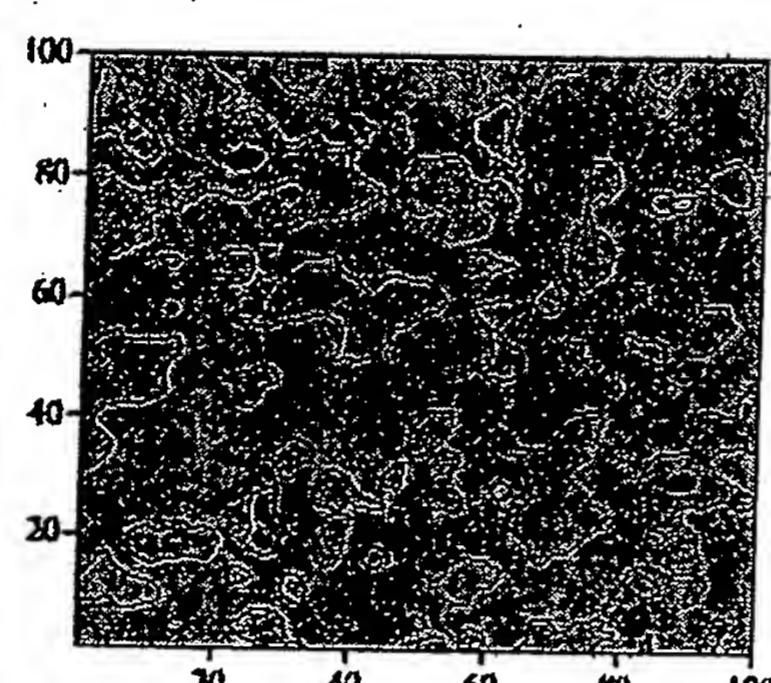
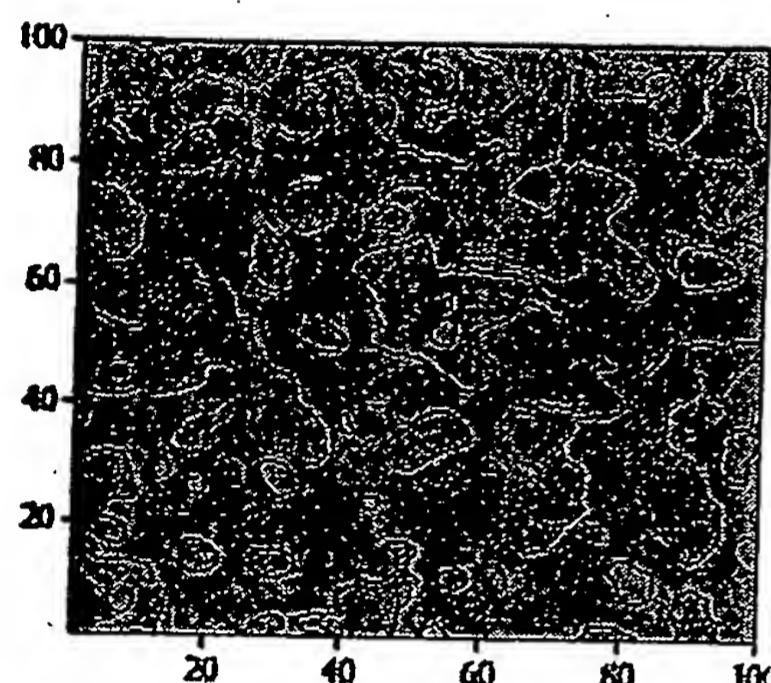
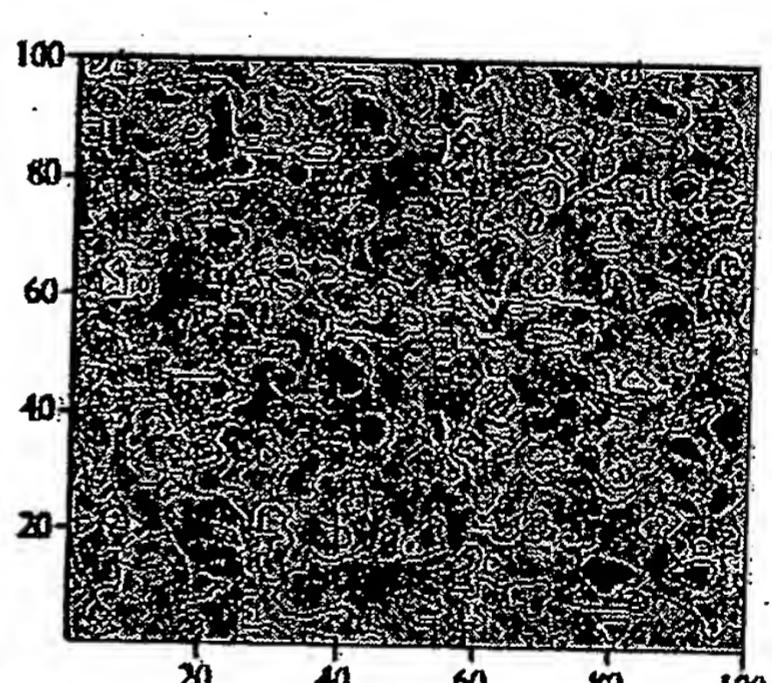
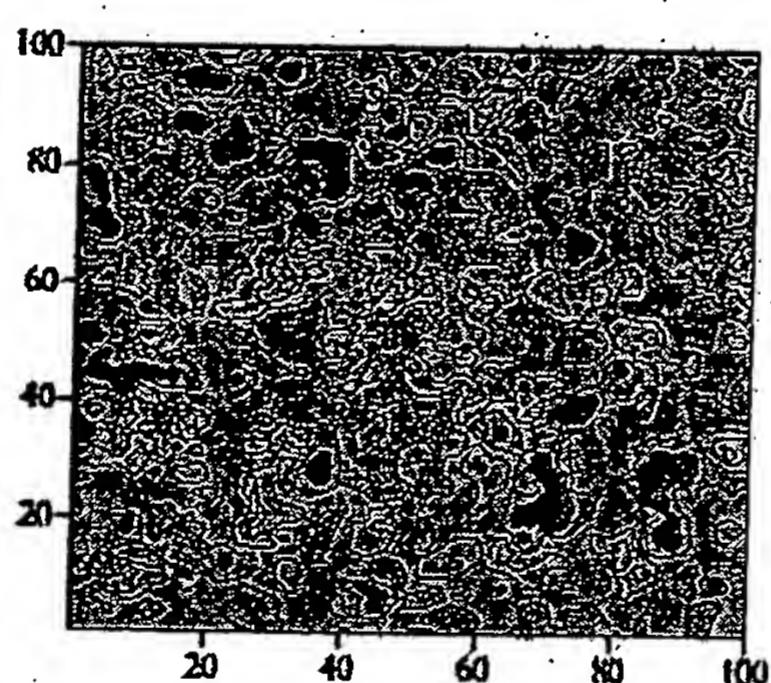
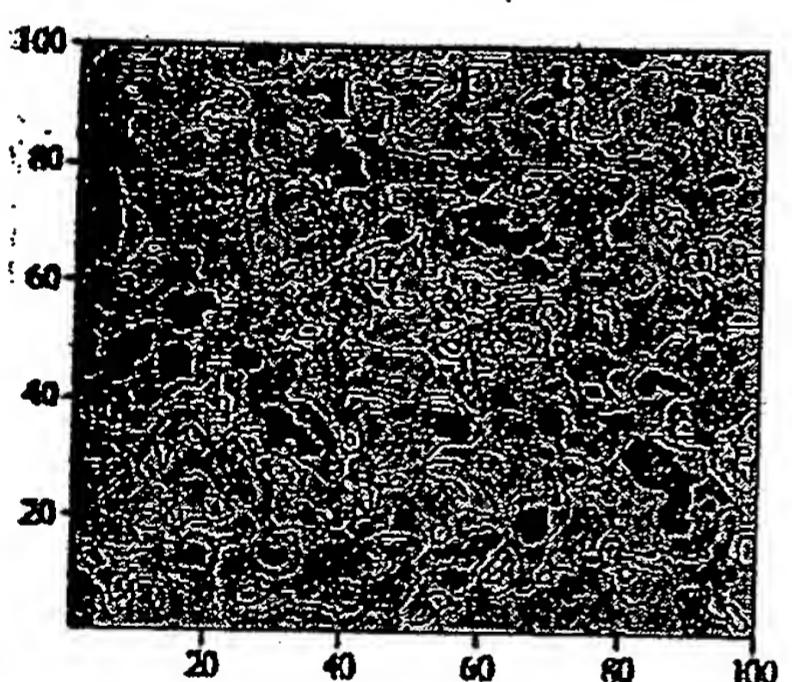


FIG. 27C



- constant  
coupling  
- no feedback  
( $\Gamma = \emptyset$ )

FIG. 28A



feedback  
 $\Gamma \neq \emptyset$

FIG. 28B

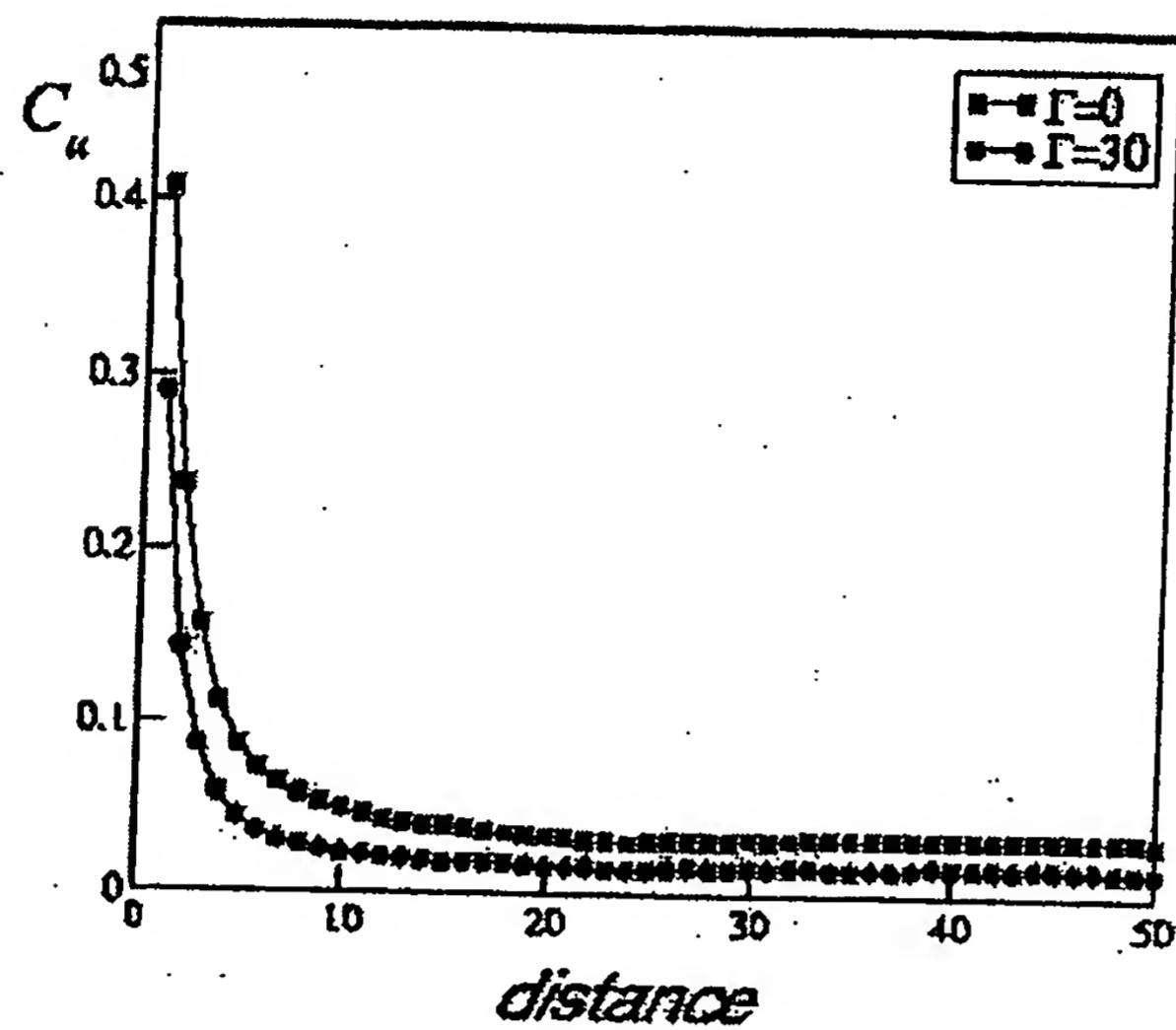


FIG. 29A

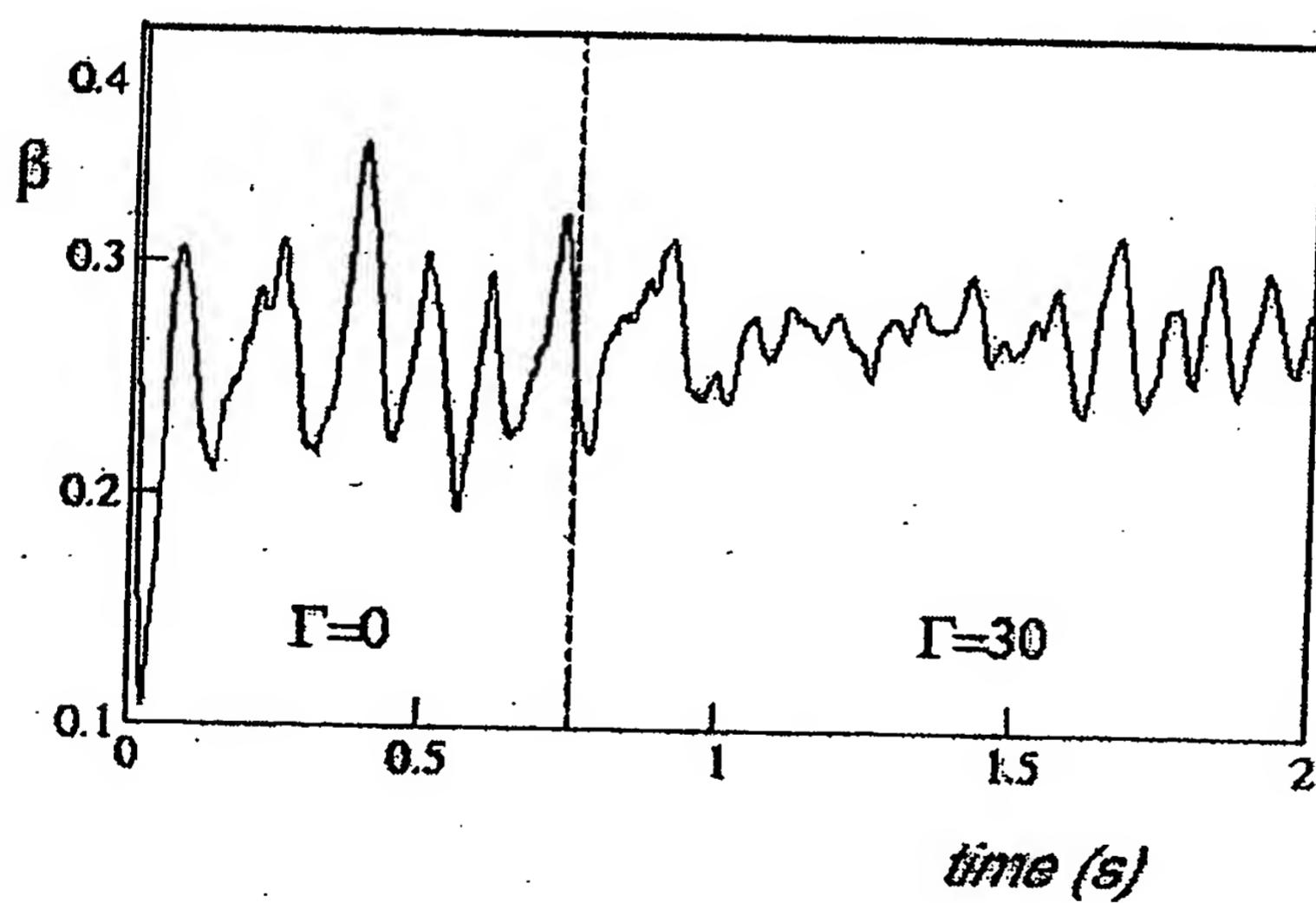


FIG. 29B

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FIG. 30A

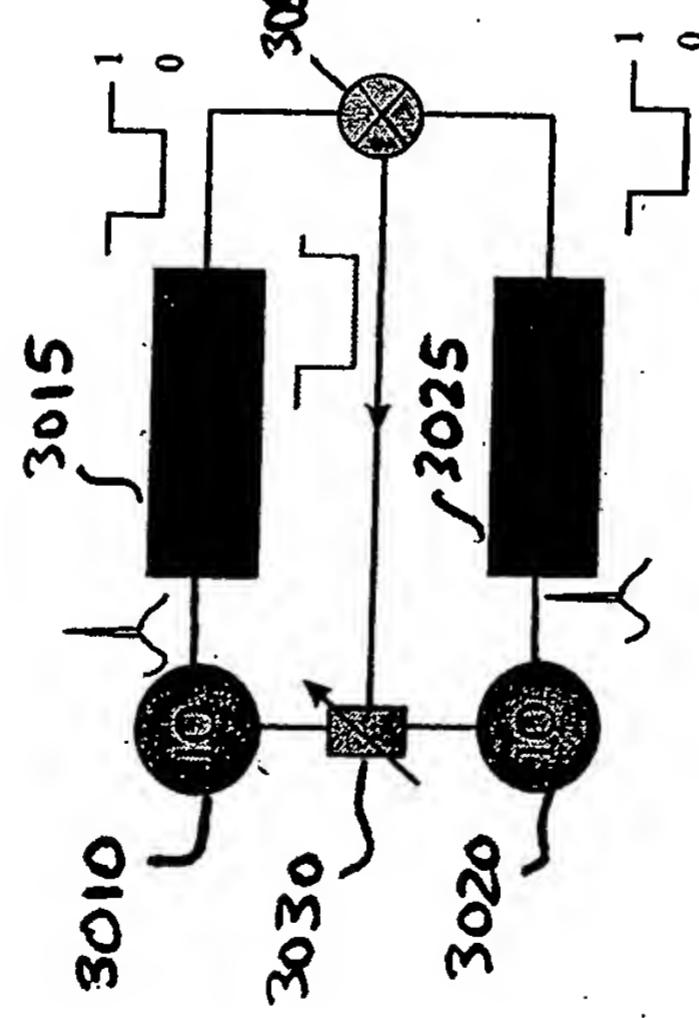
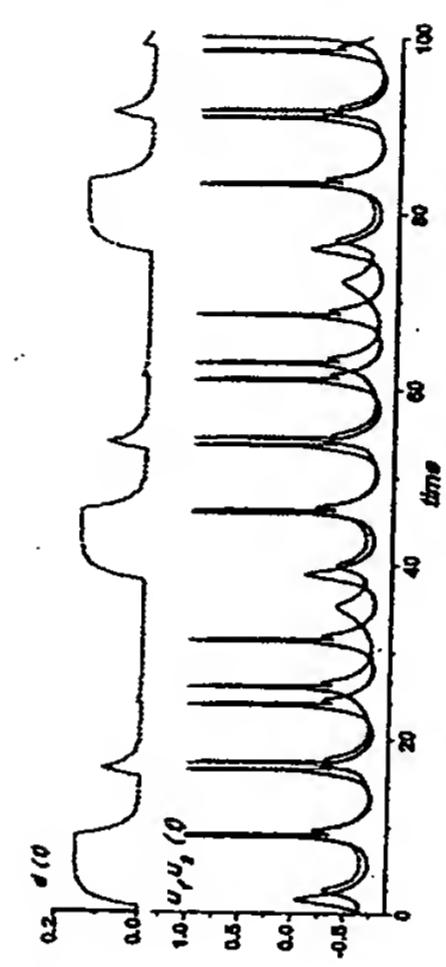


FIG. 30B



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FIG. 31A

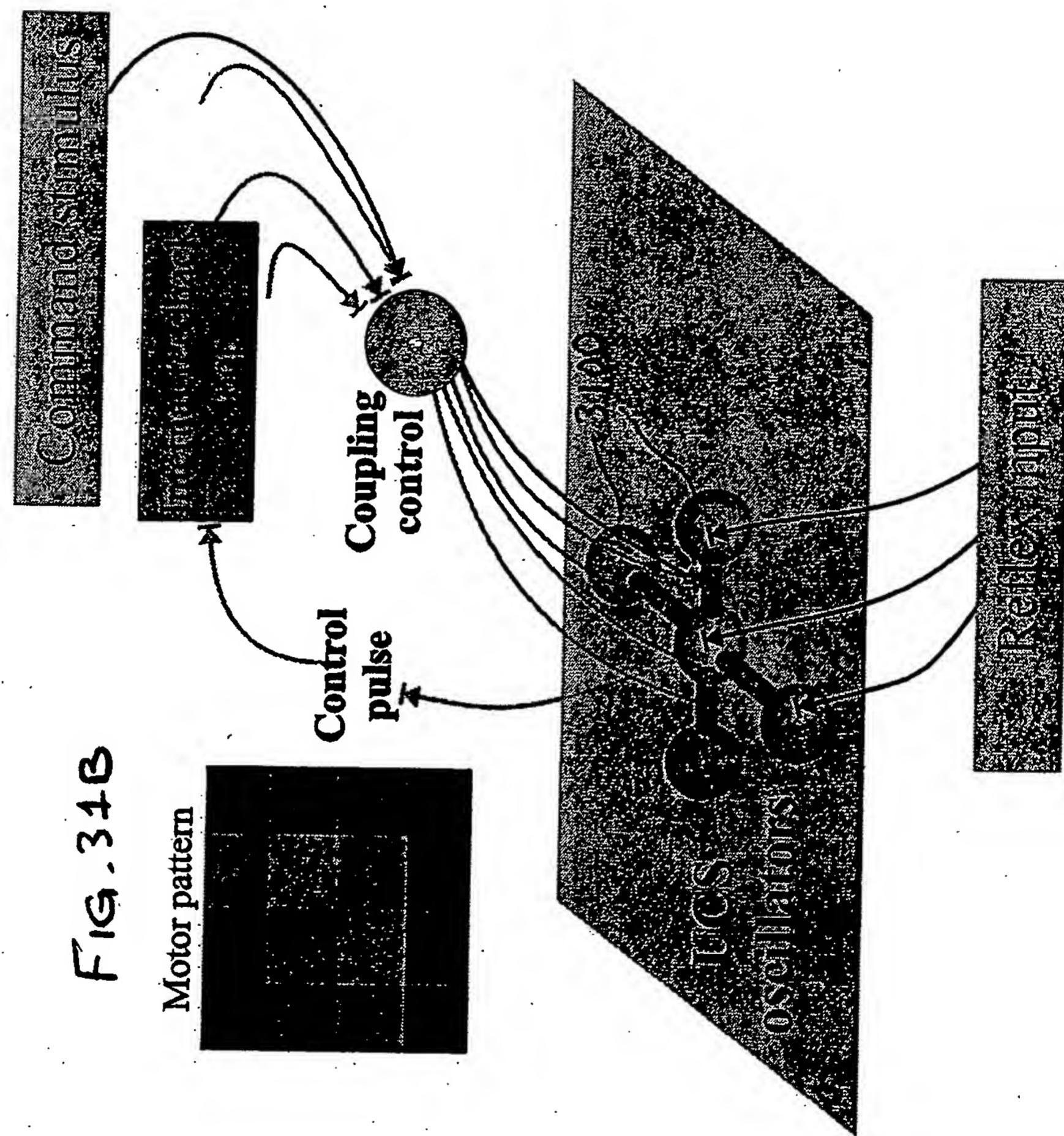


FIG. 34B

FIG.32A

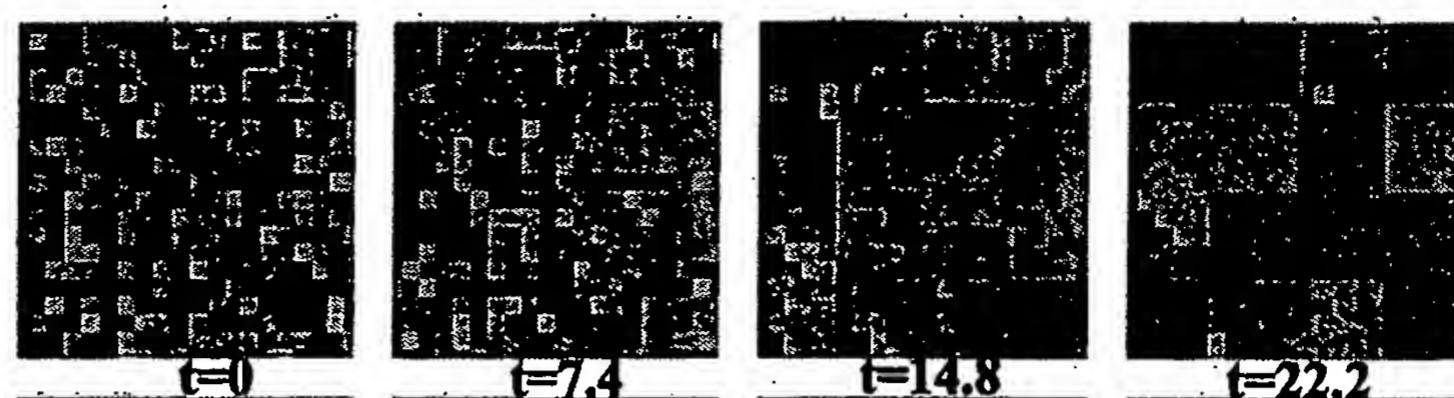


FIG.32B

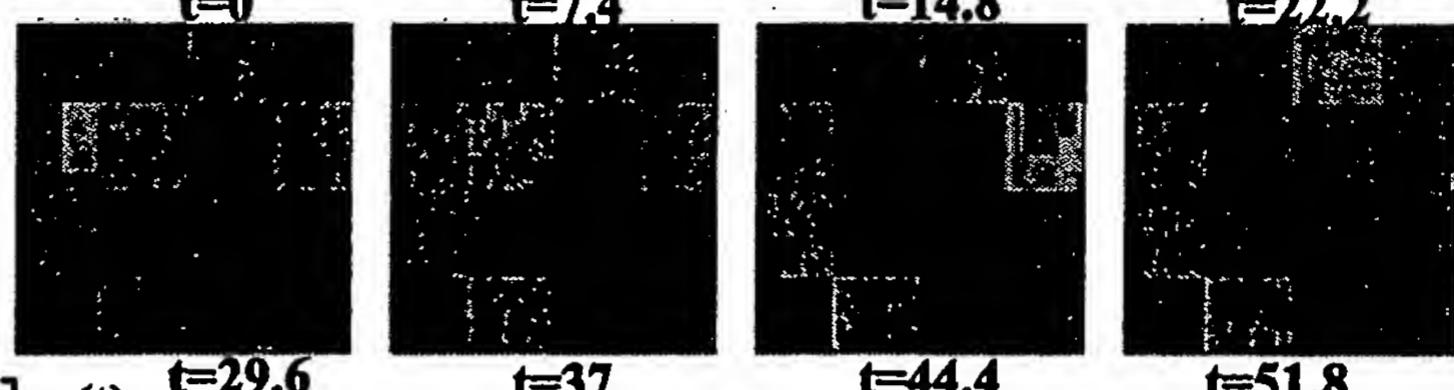


FIG.32C

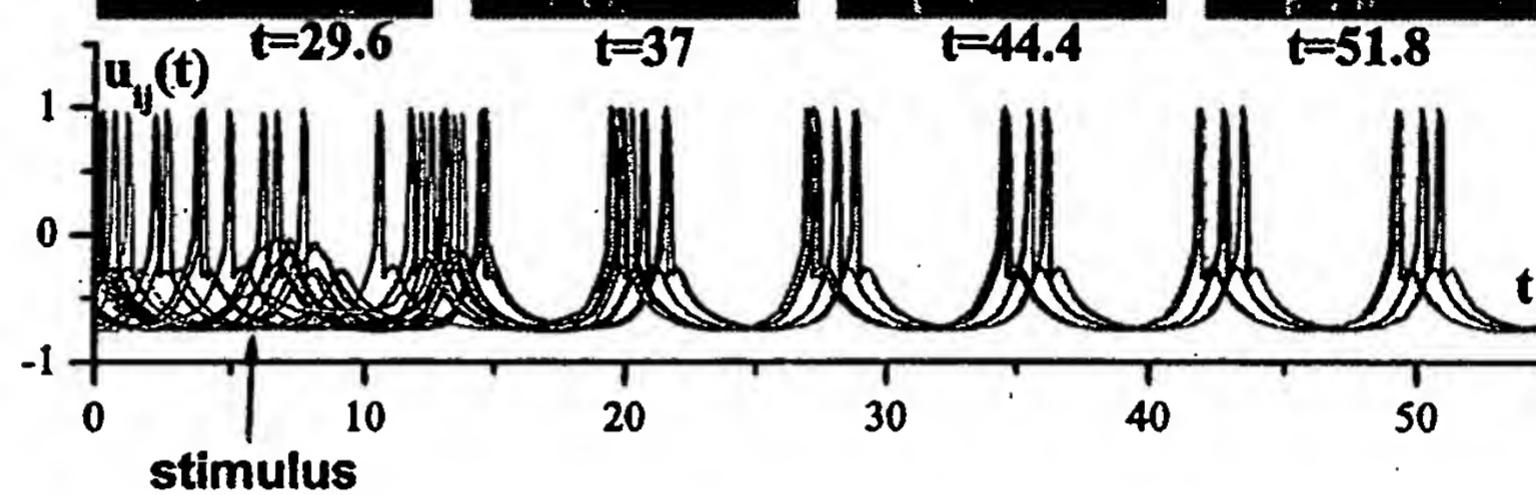


FIG.33A

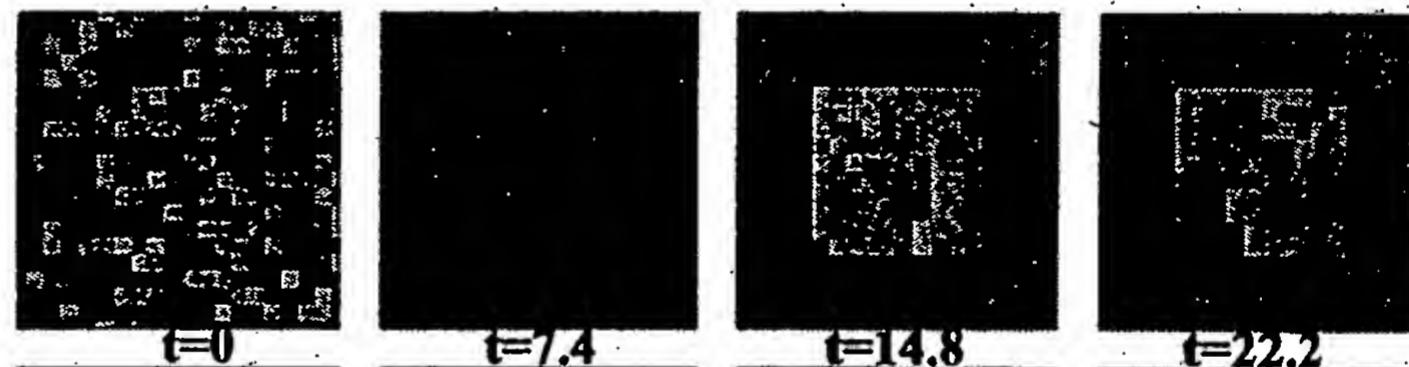


FIG.33B

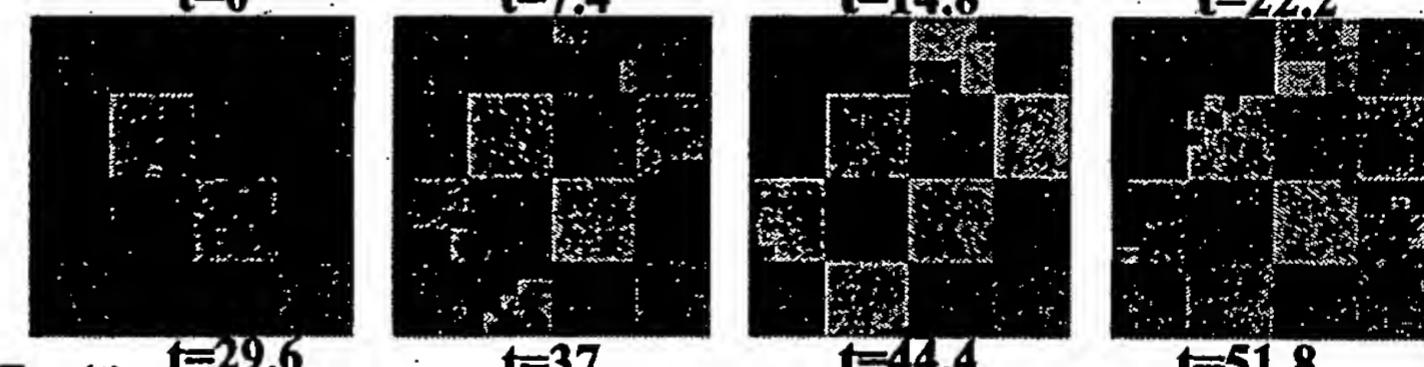


FIG.33C

